School Shop

vol. XX no. 5

JANUARY 1961

Industrial Arts Is Vital in a Creative Science Program
by Abraham Calmus

Brainstorming
by James O. Proctor

Cover Story: Denver, Colo., junior-high-school, industrial-arts student making a funnel in shop. Although learning to use one's hands starts at even a much earlier time than junior-high industrial arts, a very strong case can be made for continuing shop work at the senior-high level, especially in the case of the gifted in science and math. For report of just such a strong case, see page 7.

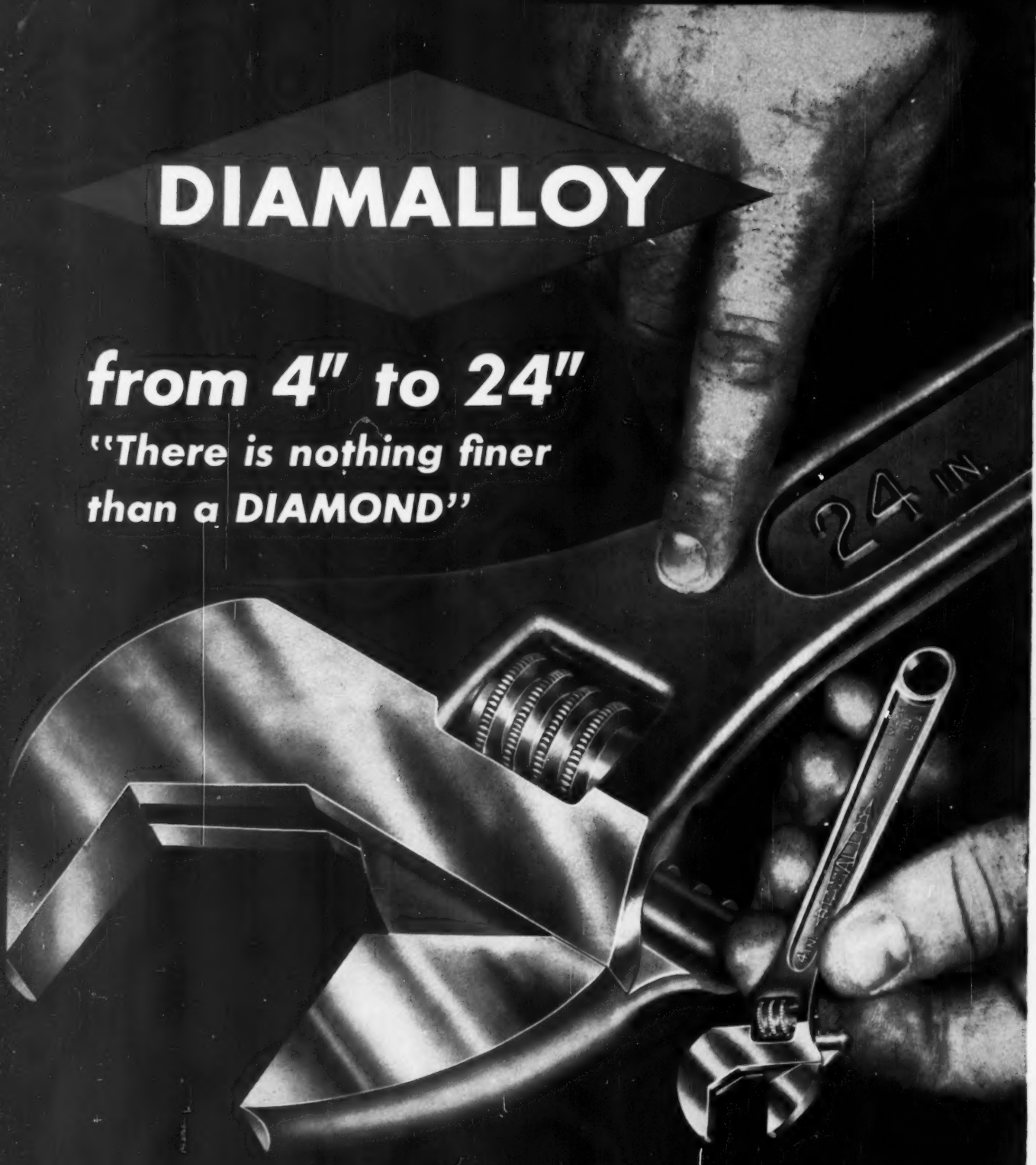
20 YEARS OF SERVICE TO TEACHERS OF INDUSTRIAL EDUCATION

Notify on Form 3579 if undeliverable

DIAMALLOY

from 4" to 24"

"There is nothing finer than a DIAMOND"



Diamond offers a full line of long established and well known Diamond and Diamalloy Wrenches and Pliers. When you order adjustable wrenches insist on the Diamalloy Brand. Stocked by leading wholesalers.

DIAMOND TOOL *and Horseshoe Co.*

EST. 1908 DULUTH, MINNESOTA . TORONTO, ONTARIO

School Shop

Editor and Publisher
Lawrence W. Prakken

Chairman, Editorial Board
Thomas Diamond

Managing Editor
Oliver E. Hanninen

Associate Editor
Jerome C. Patterson

Advertising Production Manager
Dorothy J. Buffington

Circulation Manager
Barbara N. Leake

•

EDITORIAL ADVISORY BOARD

Dewey F. Barich, President, Detroit Institute of Technology, Detroit, Michigan.

Russell K. Britton, Administrative Director, Division of Instructional Services, Denver, Colorado, Public Schools.

L. Lawton Gore, Professor of Industrial Education, George Peabody College for Teachers, Nashville, Tennessee.

J. F. Ingram, Supervispr of Trade and Industrial Education, State Department of Education, Montgomery, Alabama.

John A. Jarvis, Dean, School of Industrial Education, Stout State College, Menomonie, Wisconsin.

Albert E. Jochen, Assistant Commissioner of Education, Vocational Division, New Jersey State Department of Education, Trenton.

E. L. Kurth, Assistant Director, Vocational and Adult Programs, Florida State Department of Education, Tallahassee.

William R. Mason, Supervisor, Industrial Arts, Board of Education, Cleveland, Ohio.

Emmett O'Brien, Director, Division of Vocational Services, Connecticut State Department of Education, Hartford.

W. D. Purvine, Director, Oregon Technical Institute, Klamath Falls, Oregon.

Lee W. Ralston, Director, Division of Practical Arts Education, Los Angeles County Schools, California.

John P. Walsh, Director, Trade and Industrial Education Branch, U. S. Office of Education, Washington, D. C.

•

MEMBER OF

EDUCATIONAL PRESS ASSOCIATION OF AMERICA

CONTENTS

Industrial Arts Is Vital in a Creative Science Program . Abraham Calmus 7
What better program is there for teaching future scientists, physicians, and dentists to use their hands?

Production Planning a Project (Part II: Jigs) . . . H. J. Gerber 9
Creativity of a high order is vital in any machine shop when it is called on to produce ingenious fixtures for a manufacturing process.

1960 AVA Convention 11

Brainstorming . . . . . James O. Proctor 12
The ideas flow freely and quickly when a group of teachers gather together to solve classroom problems with this method. Things can get wild but the method is fruitful.

Charcoal Tongs . . . . . C. J. Beitelspacher 15
This is a simple forging project, but anyone who has messed around with charcoal will gladly welcome them to his bag of tools. This means high take-home value.

Dynamic Electronic Circuit Analyzer . . . . . Robert P. Balin 16
Here is a teaching device that shows students just how an electronic circuit functions. They can make these aids as projects.

In Behalf of the Radial Saw . . . . . Joseph A. Donnelly 18
Here is the other side of the story about the radial saw that is not always told, and when it is told, it is not told loud enough nor often enough.

Cart for Leatherwork . . . . . Lyle Soeteber and William Wood 20
Has great possibilities for beginning craft programs.

Embers Need Fanning . . . . . Simon Walters 22
The author could be anyone, just as the situation described in this short, short story could happen to anyone, anywhere.

REGULAR FEATURES

School Shop Talk 2
Teaching for Understanding of Principles.

In the Morning Mail 4
Comments from readers.

School Shop Kinks 24
Shortcuts for doing shopwork.

News 27
Happenings in industrial education.

The Technician 28
News about training the technician.

Diamond Dust . Thomas Diamond 29
On the Record.

Strictly Personal 30
About your fellow teachers.

Instructional Resources 34
The latest in books, pamphlets, and visual aids.

News from Industry 38
New products and teaching aids.

Index to Advertisers 47
Circle the numbers on the card for more information from advertisers.

From Washington . Michael Paca 48
News from the Nation's Capital.

January, 1961 PRAKKEN PUBLICATIONS **Vol. XX, No. 5**

Editorial and Business Office: 330 Thompson Street, Ann Arbor, Michigan.

Manuscript Information: Manuscripts are paid for at regular space rates and should be addressed to the Editor, School Shop, 330 Thompson Street, Ann Arbor, Michigan.

Subscription Rates: $3.00 a year; Canadian, $3.00 a year; foreign, $4.00 a year. Single copies, 40 cents each except April which is 50 cents. Special group rates for students in teacher-training institutions will be given on application.

Publication Information: Published monthly, September through June, at Barrington, Illinois. Printed in the United States of America, Copyright 1960 by Lawrence W. Prakken. Member, Business Publications Audit, Inc.

Advertising Sales Offices:
Chicago, Illinois—R. L. (Les) Gray, Mid-West Division Manager, 1025 Harlem Ave., Glenview, Ill., telephone PArk 4-0800.
New York 17, N. Y.—Macintyre-Simpson & Woods, 101 Park Ave., telephone LExington 2-0020.
Ann Arbor, Mich.—330 Thompson Street, telephone NOrmandy 8-7205.
Los Angeles 5, Calif.—The Jess M. Laughlin Company, 711 South Vermont Ave., telephone DUnkirk 3-7697.
San Francisco 4, Calif.—The Jess M. Laughlin Company, 465 California, telephone EXbrook 2-4050.

Postal Information: Accepted as controlled circulation publication at Barrington, Illinois, and at Ann Arbor, Michigan.

AMERICAN TECH
Publishers since 1898...

NEW
from American Tech
BOOKS
that Anticipate
Industrial Progress

COMING SOON . . .

1. Electricity and Electronics—Basic, Second Edition

Steinberg-Ford

This popular text, in use in hundreds of schools, is now available in a new edition. This revised edition is a refinement designed to keep pace with the latest electronic developments and to make the instructional method even more effective. Among the features of the new edition are a discussion of the electron flow theory of electricity, new material on transistor fundamentals and on silicon rectifiers, and the addition of new projects in various areas.

256 pages. 406 illustrations. In Press

2. Engineering-Technical Drafting and Graphics

Giachino-Beukema

The purpose of this book is to present an overview of the significant fields of drafting with practices currently recognized by industry, and basic graphical forms of representation which are needed by students of engineering and technology. It is designed to develop in the student the ability to solve engineering problems, create design requirements and convey engineering ideas.

700 pages. Hundreds of illus. In Press

3. The Instructor and His Job

Homer C. Rose

Years of experience in training top-flight instructors have gone into the development of this book. The practices and procedures detailed here have been tried and proven over a long period of application. The text first examines the personal attributes of the good instructor and makes clear some important facts about the learning process. It presents a format for preparing oneself for the various important areas of instruction.

224 pages. Well illustrated. In Press

4. National Electrical Code and Blueprint Reading

Kennard C. Graham

A pictorial presentation of safety measures and standard practices in electrical wiring. Code sections are linked to visual examples and are grouped around five specific fields of application: single-family dwellings, multi-family dwellings, commercial locations, industrial locations, and specialized and hazardous locations.

152 pages. 330 illustrations. $4.00

These books will be off the press in a few weeks. Order on-approval copies now for prompt delivery.

TEAR OUT AND MAIL TODAY

American Technical Society
Dept. W-411
848 E. 58th Street, Chicago 37, Ill.

Please send me on-approval copies of textbooks checked below. After as long as 30 days of leisurely examination, I agree to either return them, or make remittance—less educator's discount.

1 2 3 4

Name_____
Subject/Position_____
School_____
Address_____
City_____ Zone_____ State_____

School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Teaching for Understanding of Principles

In view of the growing national interest in technical education, it is natural that industrial-arts teachers are concerning themselves with the extent to which they can contribute to the general program in this field.

When you consider this problem it should be kept in mind that the teachers of mathematics, science, physics, and chemistry are doing a creditable job of introducing youth to the general principles pertaining to these respective fields. Since we must concede this point, the question arises, "What can I, an industrial-arts teacher, do that will add to what is already being done, that will be a contribution to the task of preparing pupils to participate intelligently in the activities being carried on in a technological world?"

Obviously, there is little need to repeat what is being done so well in other departments of the school. However, industrial-arts teachers have unlimited opportunities to *emphasize the application of principles* taught in other departments to the activities commonly found in their shops. If you are not completely absorbed in the production of projects, there are many ideas that you may present to the pupil without seriously interfering with his manipulative work and even buttress it. Among these, consider the following:

1. What causes lumber to shrink or warp?
2. What physical principle is involved in the use of pliers?
3. Why is the lead-screw of a machine lathe an application of an inclined plane?
4. Why is the thinner used for paint different from that used for shellac?
5. There are different kinds of steel. What are they?
6. Cold chisels and lathe tool bits are made of a certain kind of steel. Why?
7. Why is steel heated when it is being tempered?

These are only a few of the ideas which, along with similar ideas from other fields of industrial arts, the teacher can present to individual pupils when the appropriate time appears, as he moves about in his class.

If the industrial-arts teacher hopes to do this successfully, it is imperative that he be familiar with the principles taught in other classes, particularly the sciences, and be able to recognize their application in the work his pupils are doing. Teacher-trainers, who have the responsibility of advising their students in regard to their programs, should assure themselves that mathematics and science are included in the subjects students elect. Then, too, in their own classes they should suggest specific examples of the application of technological principles to the activities carried on in school shops.

It should be made clear that the shop teacher is not expected to lecture on technological principles. If, when he is demonstrating to his class, he finds an opportunity to point out where a principle is applied, he should not fail to do so. However, the most effective time to direct attention to a principle is when the pupil is at work on a project to which the principle applies. The pupil can be stimulated into considering the point the teacher wishes to make by being asked an appropriate question.

At this point, the teacher should leave the pupil alone to think about the matter. Later, the teacher can approach the boy and inquire if he has discovered the solution to the question raised earlier. If the boy has grasped the idea, all is well. If not, the teacher is in a position to point out where the subject matter covered elsewhere in the school applies to the job the pupil is now doing. This can be a revelation to the pupil and, very likely, he will hasten to unload on his fellows the great discovery he has just made.

We hear much about research in industrial arts. Those who are qualified to carry on this type of work could provide a great service to the shop teacher if they attacked the problem of determining what technical information is appropriate for presentation as part of the activities in the various areas of industrial arts. They might suggest methods of presenting this material and the kinds of projects through which technological principles can best be illustrated.

And, may we ask, what are our textbook writers doing about the problem?—*T. D.*

GOODHEART WILLCOX PRACTICAL BOOKS

LOTS OF "SHOW-HOW" *for* SCHOOL-SHOPS · EASY TO USE !

Check Books You Would Like to Examine, and MAIL COUPON TODAY!

1. **INDUSTRIAL ARTS DRAFTING.** By Walker & Plevyak. A well-rounded first, or exploratory course. Revitalizes drafting by teaching it as a Language of Symbols Used in Creative Thinking, Planning. Extra color stimulates student interest, makes important fundamentals easy-to-understand. Challenging problems. $3.75.
2. **WOODWORKING FOR INDUSTRIAL ARTS.** By Ira C. Madden. Supplies basic knowledge about tools, woods, and finishing materials used in productive shop work. Provides a wide selection of project materials of proven student interest. An outstanding text. $4.00.
3. **MOTOR SERVICE'S AUTOMOTIVE ENCYCLOPEDIA.** By Toboldt & Purvis. Greatest book available for teaching students Fundamental Principles and Basic Service Procedures — the foundation on which a sound, thorough knowledge of auto mechanics is based. Used by over 950 schools. $7.95.
4. **PRACTICAL CARPENTRY.** By Mix & Cirou. Used by more than 1050 schools. Places special emphasis on proper techniques so beginner will understand and become acquainted with best carpentry practices. New insert in four colors shows how to identify 32 different woods. Over 1100 illustrations. $5.00.
5. **MODERN REFRIGERATION & AIR CONDITIONING.** By Althouse & Turnquist. Gives students sound foundation in Principles, and acquaints them with refrigerating mechanisms and their components. Covers application of refrigeration in all branches. $7.45.
6. **MODERN WELDING PRACTICE.** By Althouse & Turnquist. Information on welding, metal cutting, heat treating, in non-technical form. Unbiased coverage of entire welding field in one book. $5.00.
7. Goodheart-Willcox **PAINTING & DECORATING ENCYCLOPEDIA.** By Wm. Don Jarvis. Complete library of up-to-date "know-how" on modern painting, decorating and wood finishing, in one easy-to-use volume. Prepared especially for use by apprentices, vocational students. $5.45.
8. **COPE'S PLASTICS BOOK.** By D. W. Cope. More than 90 useful and colorful projects. Best ways to saw, machine, polish, form, cement, clean plastics. $4.50.
9. **ALL ABOUT SMALL GAS ENGINES** $4.50
10. **ALL ABOUT HOUSE WIRING** 2.50
11. **FIX YOUR FORD** 2.95
12. **FIX YOUR CHEVROLET** 2.95
13. **FIX YOUR PLYMOUTH** 2.95
14. **FIX YOUR VOLKSWAGEN** 2.95
15. **103 EASY JIG SAW PROJECTS** 1.50
16. **72 BIRD HOUSES & FEEDERS You Can Make** 1.50
17. **95 PLYWOOD PROJECTS** 1.50
18. **PROJECTS FOR METALS** 1.75
19. **VOCATIONAL MATHEMATICS** (Shop Arithmetic) 1.50
20. **VOCATIONAL MATHEMATICS** (Shop Geometry, Algebra, Trigonometry) 1.75

MAIL COUPON *Today!*

GOODHEART-WILLCOX CO.
1322 S. Wabash, Dept. 74, Chicago 5

20% Discount To Schools, Teachers

Please send me on 30 days approval, examination copies of books I have indicated by Circling Numbers below:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Name _____
School _____
Street _____
City & State _____

Publishers of Topnotch Texts since 1921

SEND FOR CATALOG 5

NAME

TITLE

SCHOOL

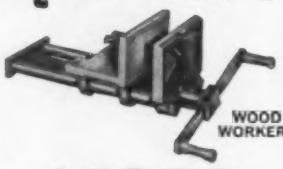
STREET

CITY/STATE

BEST

MACHINISTS

QUALITY



WOOD WORKERS

VISES

HINGED PIPE

FOR

DRILL PRESS

SCHOOLS

You can fill every vise requirement from the broad Simplex line of fine vises for schools. Guaranteed for the life of the vise against defects in workmanship or material. Get industrial quality for your shop now.

Desmond Simplex

The Desmond-Stephan Mfg. Co.
URBANA, O.

IN THE MORNING MAIL...

(Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sir:

The electrical diagram for the desk lamp shown on page 13 of the November 1960 issue of SCHOOL SHOP should be changed so that the starter is placed in the wire that connects the two filaments of the fluorescent tube.

L. E. Brandstatt,
Supervisor of student teachers of industrial arts,
Chico, Calif., State College.

(*Editor's Note*: A doff of the editor's eyeshade to Supervisor Brandstatt for being so observant as well as for calling this error to the editor's attention.)

Dear Sir:

Enclosed you will find a complete and revised list of the industrial-education teachers of the Tucson public schools for 1959-60. I would appreciate your sending copies of SCHOOL SHOP to these teachers. The magazine is certainly outstanding and a great help in our teaching. . . .

We certainly appreciate your generosity and excellent cooperation in furnishing us copies of your excellent magazine. It is certainly a great aid in teaching industrial arts, and we are always looking forward to the next copy. The April 1959 issue on "The Technician and Industrial Education" was very timely and outstanding.

Louis J. Bazzetta,
Coordinator of Industrial Education,
Tucson, Ariz., Schools

(*Editor's Note*: City directors are urged to send their list of shop teachers, including school address and specific shop subject taught, to Circulation Dept., SCHOOL SHOP, Ann Arbor, Mich., so that the magazine can be sent to their teachers.)

Dear Sir:

I ran across an article in one of my back copies of SCHOOL SHOP that exhorted us to "take the boys to the school library" and I would like to comment on it.

From the librarian's standpoint, it is undoubtedly a wonderful idea. But this whole problem can be solved by taking the librarian's suggested solution one step farther: set up a workable shop library and planning center right in the shop.

Every school that I have taught in, including my present school, has permitted me to sign out all of the shop project and reference manuals for use during the entire school year.

At the end of the year, this material has been checked back into the library for annual inventory. We have lost very few books and none has been damaged. (In many cases there have been duplicate books in the library, thus making it possible for students to take books home for overnight loan.) Consequently, we have an impressive book shelf in our shop library, and I can assure you that the books are used.

Our librarian cooperates by procuring wall charts, bulletin-board materials, magazines, and teaching aids for us. Our high school has a student population of about 2500 so you can see readily that she is kept rather busy.

Donald Kinnaman,
Camelback High School,
Phoenix, Ariz.

About Shop Teachers Service

Dear Sir:

Here are my coupons for your "Shop Teachers Service." Each fills a real need of industrial-arts teachers, and we certainly do appreciate this service.

Your magazine is always welcome each month, and we look forward to receiving it.

John M. Fessant,
State School for the Deaf,
Salem, Ore.

Dear Sir:

Enclosed are the coupons which I clipped from your fine magazine. The service you offer is certainly a help in saving time for teachers.

Thank you very much.

Clyde R. Cover,
Upper Adams Joint School System,
Biglerville, Pa.

Dear Sir:

Thank you for taking care of ordering all of this material. Your efforts are greatly appreciated.

H. W. Anderson,
Gray Junior-High School,
Tacoma, Wash.

Dear Sir:

Enclosed are coupons for free teaching aids. I want to take this opportunity to tell you that we appreciate this service very much and that it has been a great help to us.

S. N. Guckenheimer,
New Philadelphia and Dover City Schools,
New Philadelphia, Ohio.

Dear Sir:

Enclosed are three coupons that I clipped from an October copy of SCHOOL SHOP of a year ago. I realize that the time limit has long been passed, but I am wondering if you might possibly have some of the information still available.

I have just recently had to start teaching metal shop for the first time in my life, and I am anxious to get all of the help that I can find. Our regular metal-shop teacher went with the government, and I have been unable to find a replacement for him. A mechanical-drawing teacher has taken over my regular work.

We look forward to receiving SCHOOL SHOP magazine each month, especially for the projects that you report. They give us new ideas to vary the old way of doing things.

If the information I have requested is not available any more, would you send me what other information you might have available.

G. J. Giesler,
Coordinator of Industrial Arts,
Russell High School,
East Point, Ga.

(*Editor's Note*: We regret that it is impossible to service Shop Teachers Service coupons beyond the deadline date because the teaching materials offered by SCHOOL SHOP advertisers are limited in quantity.)

Dear Sir:

Thank you very much for "Shop Teachers Service." It is most welcome.

Nathan Peiss,
Oak Park High School,
Oak Park, Mich.

DELTA Metal Lathes help you do more— with added safety, extra capacity

You teach with the tools they'll use in industry when you use Delta Metal Lathes. 11" Cabinet models (like those shown above) are used extensively in tool rooms and precision experimental work in metalworking shops across the country.

You can choose any model of Delta's famous 10" metal cutting lathe, the new 'Long Bed' 10" lathe (with a big 36" capacity between centers) or the husky 11" lathe to help you meet your particular school shop needs. Every one is engineered to give you an exclusive combination of features that make it the big value in its class.

You'll recognize the teaching advantages of variable speed drive, quick change gear box and the extra big collet capacity. And you'll appreciate the two new safety accessories for all Delta 10" lathes: Mechanical Back Gear Lock-out Kit and Magnetic Starter Electrical Disconnect Switch Kit. Used together, these guard students from moving gears and guard against damage to the machine. For back gear operation, student must release the lock-out mechanism. To do this, the headstock cover must be raised—this action shuts off the motor automatically.

Call or visit your Delta Industrial Distributor (listed under "TOOLS" or "MACHINERY" in the Yellow Pages) for a demonstration of the many quality features these lathes offer to help your students learn operating techniques quickly, safely and easily.

FREE CATALOG

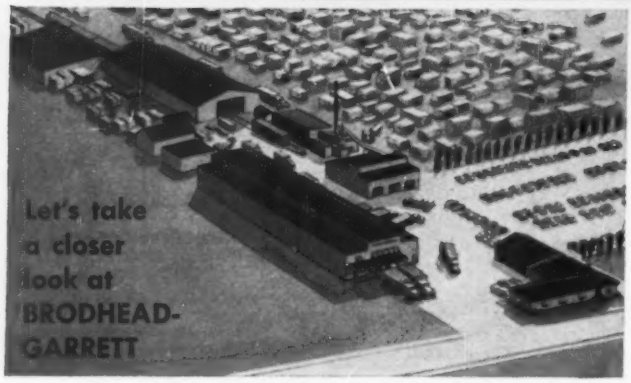
Complete specifications on the entire line of Delta Metal Lathes and full range of accessories. Write: Rockwell Manufacturing Company, Delta Power Tool Division, 412A North Lexington Ave., Pittsburgh 8, Pa.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL

From Coast to Coast it's BRODHEAD-GARRETT



A GREAT INSTITUTION

...**THAT OFFERS** the most complete line for school shops in the world.

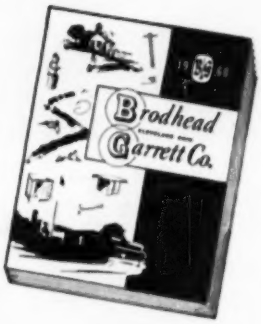
...**THAT IS** constantly bringing you the latest in Hardwood Lumber, most modern Equipment, and the newest as well as the old-standbys in Supplies.

...**THAT PUBLISHES** an annual Catalog that serves as the "Bible of the school shop field", which it has been doing continuously for over 30 years, and currently shows and lists more than 20,000 items.

...**THAT BLANKETS** the country with its crack team of District Managers who call on schools, and are thoroughly expert in New Shop planning as well as furnishing complete Parts, Materials and Supplies program.

...**THAT YEAR** after year supports and exhibits at your State and National Conventions, County and City meetings.

...**THAT MONTH** after month greets you in your trade magazines with News of "What's New" and challenging in Products, Contests, and Better Methods of Serving you more Efficiently and Economically.



1st PRIZE $300.00 cash
2nd PRIZE $200.00 cash
3rd PRIZE $100.00 cash

Enter BRODHEAD-GARRETT's LUMBER CONTEST!

The above is a reproduction of one of B-G's Contest Ads.

BRODHEAD-GARRETT CO. 4560 East 71 St., Cleveland 5, Ohio
Lumber, Machinery, Benches, and Hand Tools

Whether the aim is dentistry, medicine, nuclear physics, or what have you,

Industrial Arts Is Vital in a Creative Science Program

By Abraham Calmus
Head, Industrial-Arts Department, The Bronx, New York, High School of Science

AN article about the industrial-arts program at Bronx High School of Science that appeared in SCHOOL SHOP more than two years ago ("Students Make Science 'Real'," June 1958, page 5) continues to draw inquiries and visits from teachers and educators who are interested in what we are doing in our industrial-arts program for students gifted in science and mathematics. The current interest in gifted students has, obviously, stimulated this interest even further.

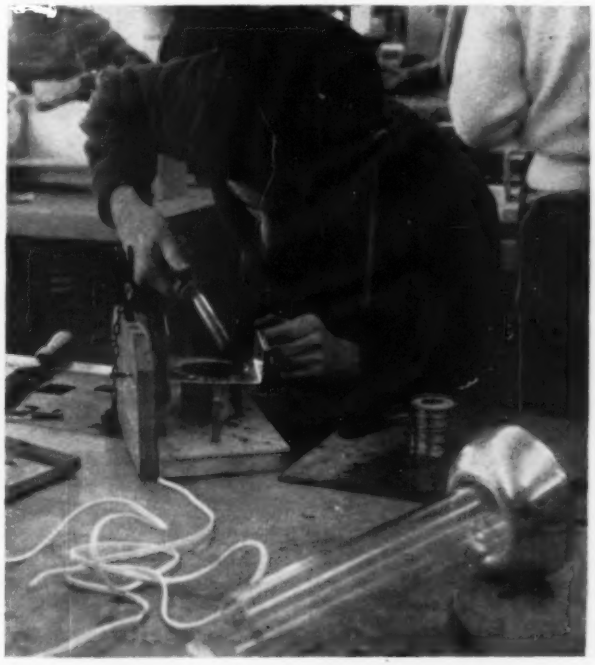
Some of the questions asked of us, and some of the suggestions we have made to others, should be of interest to the large number of educators who are becoming increasingly aware of the possibilities in a program of industrial arts that can interest and challenge gifted students. Our comments and answers have been in terms of our experience at the Bronx High School of Science. It should not be difficult, though, to apply them to other situations on a trial and adjustment basis.

A short review first, however. The Bronx High School of Science is a "special" school. Its students are selected for their superior general intelligence and their interest and potential ability in science. For this reason, selection of projects to be made by students in our shops is limited to those based on science or those that illustrate basic principles of science. Manipulative skill is encouraged, of course, but it is not overemphasized. We strive for understanding of what is involved in the construction of the project, and the ability to plan, organize procedure, and carry a project to satisfactory and approved completion. Individual interests and special aptitudes and capacities are always given careful consideration.

Q. How can a program like ours be started?

A. No two schools have the same problems. There are many variables which have to be considered such as: the students' range of intelligence and interests; the industrial-arts teachers' knowledge and experience, as well as their age and physical condition, their interest, drive, and willingness to experiment; science teachers' willingness to cooperate; physical facilities and money available; community interest, and so on. The important thing is to *begin*. If necessary, begin with one class, or part of a class. As problems arise, they can be discussed by a committee of industrial-arts teachers, science teachers, and administrators, and decisions can be made. These decisions should be tentative solutions to the problems, subject to periodic review and adjustment. Most problems repeat themselves term after term, varying only in degree, so that after the first term it should be smooth sailing.

When our program was started, our shop teachers came from general schools where students were not selected by entrance tests. Because their knowledge of science was limited, or had faded, each teacher was assigned to teach a class in physics. This forced them to refresh their knowledge of science and helped them to develop an understanding of the students and their interests. Specialists in particular areas of science were available for consultation, and they still are. Gradually, our teachers learned from experience and developed confidence in themselves. New problems continued to arise, but decisions were made,



". . . the techniques of manipulation in surgery, working with radioactive materials, which have to be located accurately in space, micro-manipulations, and amplification of delicacy of touch are only a few examples of the application of the principles of simple machines on which all use of tools and instruments is based. . . ."

action was taken, and adjustments were made later when desirable. Our new building presents new problems every day, problems which could not possibly have been foreseen. We make decisions, implement them, and make corrections when necessary.

Don't expect too much. Adolescents are at a stage of development when their interests are changeable. Some who begin work enthusiastically on a project may lose interest because of difficulties and must be helped and encouraged. Others will develop enthusiasm as they progress on their projects finding, perhaps, that they have unsuspected skills. Our students are an unselected group so far as industrial arts is concerned, and we work on that basis. Entrance tests cannot predict such qualities as enthusiasm, drive, creativeness, and imagination. That is why in some terms there will be quite a number of exceptionally good projects, whereas in other terms there will be only a few really good ones. Or, perhaps, we have become too critical.

Q. Should students be selected, or should volunteers be accepted? (We were asked for our opinion. All students at our school are required to take science techniques laboratory and basic mechanical drawing.)

A. Our experience would indicate a combination of both. Those with outstanding ability in science should be persuaded to join the class for the prestige effect. Certainly, volunteers should be accepted, provided they have the qualities of intelligence and interest which are desirable. We ourselves cannot foretell the outcome of a student's efforts until we approach the end of the term.

During the early stages of a program, quite a lot of data and anecdotal information should be recorded about each student. Only in this way can the results of experience be evaluated. No general conclusions are justified, however, until a reasonable amount of time, at least one year, has passed. We have more than 20 years of experience, and we still hesitate sometimes to generalize.

Q. How large should an industrial-arts, science-project class be?

A. Certainly not more than 16 at the beginning. As experience is gained, the teacher may be able to handle more, but the absolute maximum should be 24. We are assuming, of course, a class in which every student plans and makes an individual project, different in every way from those made by other students. A class in which every student makes a radio or a telescope, varying only in size, is not our kind of class.

The need for individual instruction is the most important factor. With more than 20 years of experience with the individual-project type of program behind us, we are convinced that current thinking on class sizes is sadly out-of-step with current needs. Even the New York State Department of Education recommended maximum of 25 students is much too large for the individualized type of class which we conduct.

While many of our classes are as large as 28 (this means 28 students attending regularly), we would certainly not wish to give the impression that it is possible to teach a class of this size as it should be taught. Because we encourage our students to attempt projects which are challenging to them, presenting problems which they must be led to solve, more individual attention must be provided than is required in any other high-school shop class. If a class has 28 students, the 28 projects will be based on a wide range of science interests. Student ability and drive will vary. In a crowded shop, the teacher must be exceptionally vigilant to forestall and prevent accidents. All of this will impose a strain on the best of teachers. Only because of their long experience, wide knowledge, and "know-how," gained with so much effort over so many years, can our teachers handle classes of this size. They "handle" them, it is true, doing as much as they can, but it is impossible to give students the amount of attention which is essential for optimum results. Properly taught, our kind of shop course demands smaller classes and a lower pupil-teacher ratio.

We definitely do not recommend imitation of our class sizes. The smaller the better.

Q. How long should a course be?

A. This will depend on the purpose of the course. Until last year we had a shop course for ninth-year students which was one semester long and provided enough time for what we wanted to accomplish. The classes met twice a week for a double period of about 80 minutes. We used the limited elective system, with exceptions for some students who had special interests and abilities. We provided about 12 fairly simple projects for the students to choose from, with a limit of four students making similar projects. I say "similar" because there is usually an individual variation from the basic design which results from mutual criticism and the teacher's subtle, or not so subtle, encouragement to experiment. We found that this approach, during the ninth year, fostered confidence and encouraged initiative. Now that most of our students enter the school in the 10th year, this course has been discontinued.

Our 11th year science-project shop course involves two 80-minute work periods and one 40-minute demonstration period per week for one semester. Projects within each class are all different and on a more advanced level than was acceptable in the now defunct ninth-year course. Students are more mature, and we strive for better design and craftsmanship. Limited time and space, and excessive class size, force us to limit projects in some ways so that creativeness, too, is limited. Some students, the real enthusiasts, take advantage of time available outside of regular class meetings to work in the shops when the teacher is present.

We feel that a year of continuous work provides the opportunity to encourage and develop creativeness and practical-problem-solving ability in more students than is possible in one semester. More ambitious projects can be attempted, and interest among teachers as well as students can be stimulated. Students with limited ability and interest can be required to complete only one term of work, as at present.

Q. How do we motivate the science-project course?

A. This is a real problem with some students. Their parents want their children to become wealthy doctors, dentists, chemists, physicists, and teachers who use their brains rather than hammers, saws, chisels, and drills.

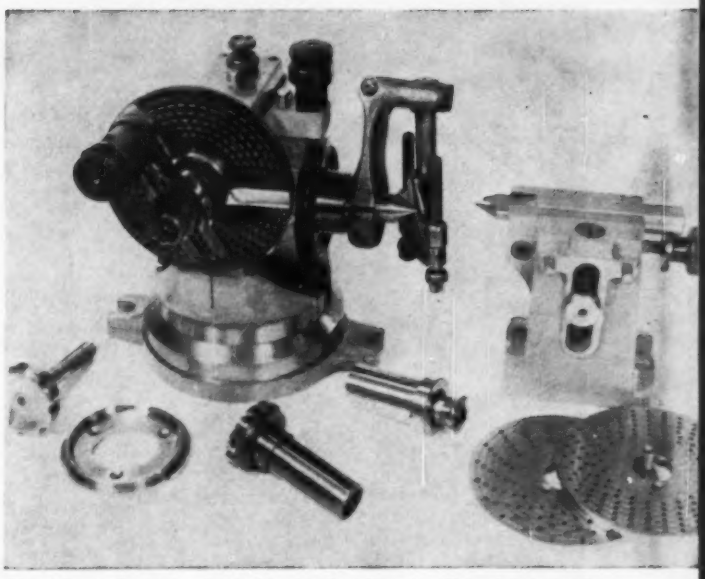
We find that students who have taken our former ninth-year course, based on general science, need little, if any, additional motivation. They have much more confidence and initiative than most students who come to us after spending their ninth year in the junior-high schools.

(Continued on page 31)

Production Planning a Project (Part Two: Jigs)

By H. J. Gerber

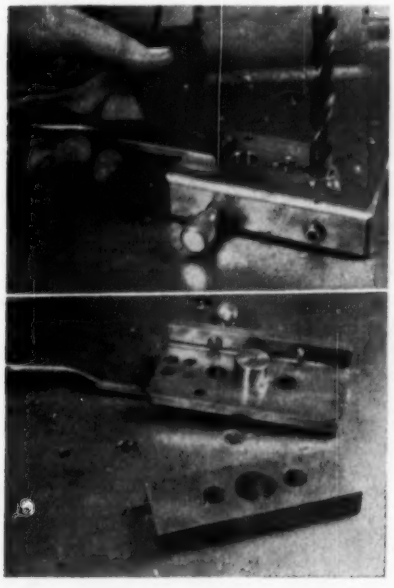
Head, Machine-Shop Department,
Oklahoma State University, Stillwater



The "Omega" universal dividing head, tailstock collet adaptor, and set of index plates. The tooling illustrated in this and a subsequent article are used in the production of this machine-tool accessory.

(*Editor's Note:* The third part of this series of articles, titled "Miscellaneous Special Tooling," will appear in a forthcoming issue of SCHOOL SHOP.)

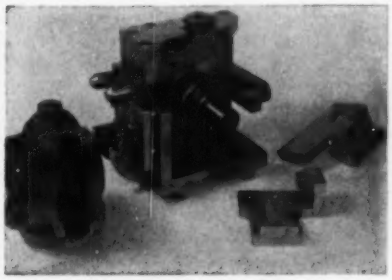
A template type of jig which is supported on the work rather than the jig supporting the work. The top photo shows the jig in use. Two press-fitted, hardened bushings guide the drill. The bottom photo shows the jig unloaded. The work locates from the previously machined center hole on to the hardened and ground stud in the center of the jig. One lock screw pivots the work tightly against a locked-screw locator that is located at one side of the jig shown below.



THE first article of this series (SCHOOL SHOP, September, 1960, p. 14) described a philosophy behind the use of a rather complex machine-shop project to teach creativity in machine-tool subjects. Such a project is never intended to be entirely an end in itself. To be most effective, the making of it, and the making of those tangible structures we call "tools," must be closely woven into a complete fabric of creative planning. From the original conception of the product to the planning of processes and designing of special production tooling, all activities are but stages in a conscious effort to push for new ideas.

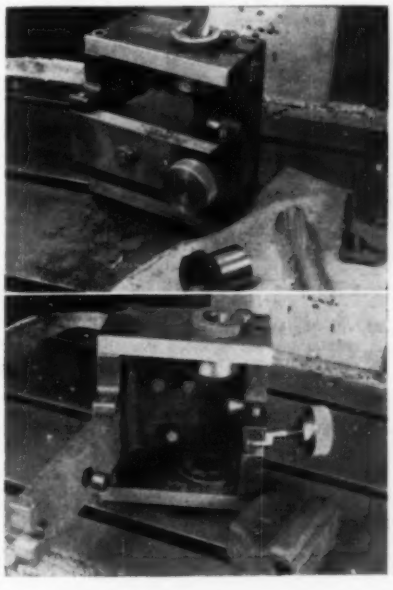
The objective then has several facets. They are:

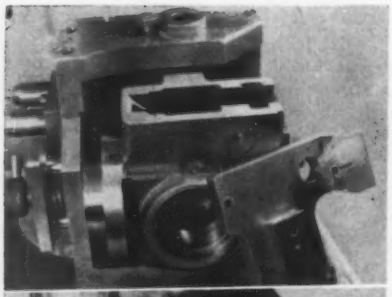
1. To provide the students with an interesting subject for processing.
2. To provide a considerable number of diverse components of a whole assembly, parts which may be variously tooled, and, therefore, will be

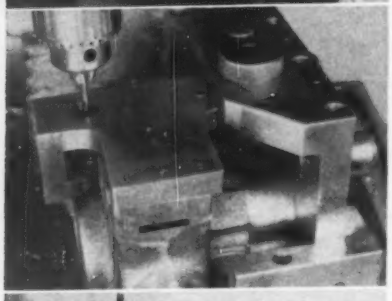


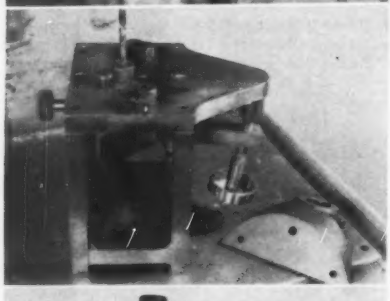
The master box jig and two auxiliary jigs for the dividing-head housing. These three jigs are used to locate precisely a total of 14 holes in the casting shown at left.

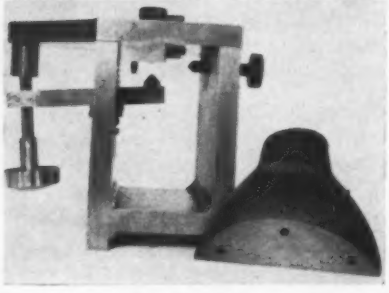
A box jig for drilling and reaming the spindle hole in the tailstock block. The top photo shows the jig in use with two slip bushings in a hardened liner-guide drill and reamer. Bottom photo: Same jig but empty.











The photos above show (top to bottom): One of the two auxiliary jigs (second column, previous page) being used to drill two oil holes to the spindle bearings. The second photo shows the drilling of the rear spindle bearing oil hole. Note the hole goes through a clearance hole to the underhanging bushing holder. This is necessary so that the bushing can be as near as possible to the surface being drilled. The third photo shows a jig for drilling three holes in the bottom of the auxiliary trunnion support. Slip bushings are used so that the piece can be tapped while supported in the jig. The last photo shows the previous jig unloaded. Note the lever clamp with a sharp pointed contact which seats against a curved surface to hold the casting tightly against the button locators that are positioned on the underside of the jig's top plate.

an incentive to creative practice in tool design.

3. To coordinate the tooling and processing into an orderly and planned procedure.

The shop-laboratory then becomes the area in which these ideas, created by the students themselves, can be transformed into the reality which they are seeking.

This article illustrates and describes a number of typical "jigs" which were planned, designed, and built by our students for use in the production of the "Omega" dividing head shown above.

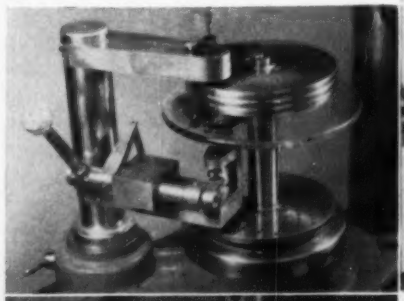
Jigs are among the most interesting of all production tools. They are usually more complex than fixtures because they have an additional function to that of holding the work. A jig is defined as a "special tool which is designed to hold (or be held by) the work and to guide the cutting tool." This added function of guiding the cutting tool usually means that the design and building of a jig is a somewhat critical job because dimensional and geometric tolerances of the resulting work are maintained largely through controls built into the tool itself.

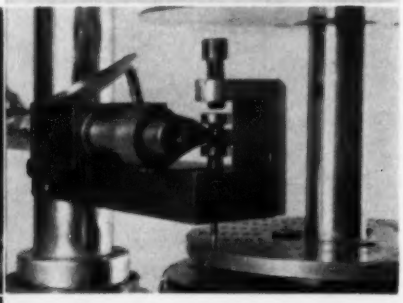
Jigs can be used on many different types of machine tools. The largest proportion of them, however, are used on drilling machines. Guiding of the cutting tool is usually controlled by the use of hardened steel bushings which direct the drills, reamers, counterbores, and other cutting tools to the exact desired location.

Top photo below and two photos at right courtesy of *The American Machinist*

Jigs usually differ from fixtures in another respect: A jig is not often fastened to the table of a machine tool. It is almost always hand movable so that its guide bushings can be positioned to the cutting tool. A fixture, on the other hand, is almost invariably secured – tight and immovable – to the machine tool. It might be stated here that the above definition of a jig is commonly accepted in all metal-working industries except the aircraft industry. They still often use the term "jig" to refer to workholding devices used to correctly position several component parts for assembly into one unit. The design of jigs can range all the way from simple to complex. They may be used for locating one hole in a workpiece or they may locate dozens.

All special tools, such as jigs, fixtures, press dies, and special devices for standard machine tools, are the means by which the principle of "transfer of skill" is accomplished in industry. The meaning of this term is that the knowledge and skills of the tool designer and toolmaker are utilized to make the complex and highly precise production devices with which the semiskilled or unskilled





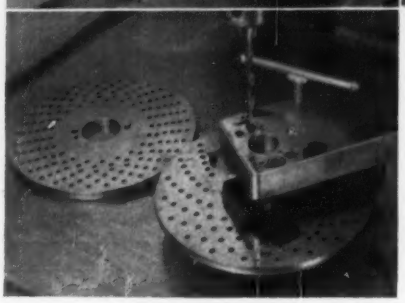
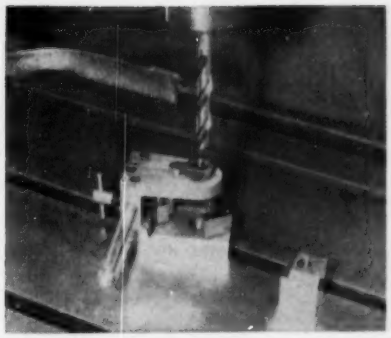


Photo at upper left is a precision indexing transfer jig designed to drill and ream numerous circles of equally spaced holes in the three different indexing plates used on each dividing head. At left: a jig for drilling holes in index plate. Holes are for mounting plate on worm-shaft assembly. The top photo (above) shows the disassembled parts of the precision indexing transfer jig. Immediately above is a close-up of the index pin assembly. Master plate is at the left.

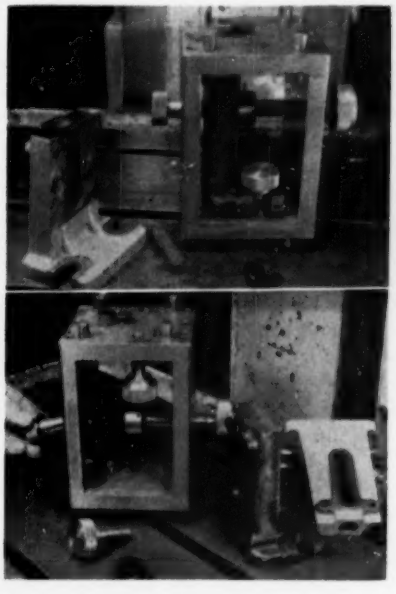


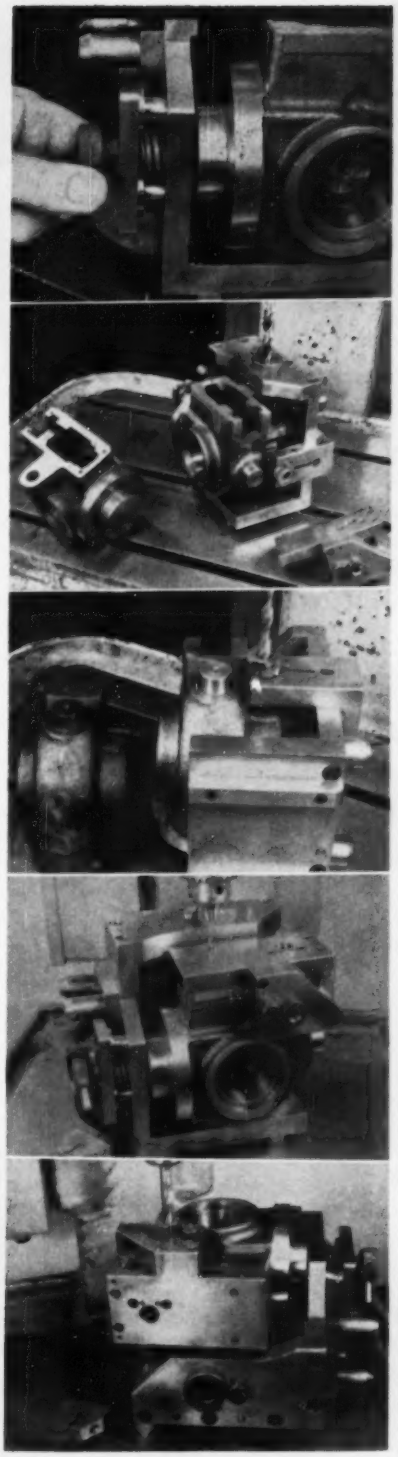
A small jig for drilling and reaming the worm-shaft tilt block. Lever on the jig is for holding the jig against the drill's torque.

workman can produce high precision metal products quickly and in large quantities. The ultimate in this principle is, of course, the designing and building, by engineers, technicians, and skilled tradesmen, of the large automated machine-tool lines now becoming so common in the auto and other consumer-goods industries.

It will be recognized by persons in this field that not all of these illustrated designs are revolutionary. Creativity does not demand this. Good and creative designs can be obtained by combining old ideas in new ways to meet new situations. It is not always desirable to be entirely fanciful. Down-to-earth ideas are often the best. ★

The top photo (below): a rollover box jig for drilling, reaming, and counterboring a multidiameter hole running through from top to bottom of the tailstock casting. The picture at bottom shows the same jig turned over and unloaded. The drilling is done from both top and bottom. Note that feet of the jig are made of hardened steel.





From top to bottom (above): the dividing-head housing being squared up in a jig by tightening the equalizer. Second from top: drilling the hole in which the spring-plunger assembly for the direct-index plate will be fitted. Third from top: the jig turned over 90° and the hole for the spindle lock being drilled. Fourth from top: two small holes being drilled in casting for screws that will hold spring saddle for the worm-gear shaft assembly. Bottom photo: The jig turned over another 90° to drill a hole for the tilt-block lock screw. The bushing's removed.

Next President of AVA to be a "Home Ec" Chief

THE American Vocational Association nominated at its 54th annual convention two, state, home-economic supervisors to be candidates for the presidency of the organization in 1961. Nominated for election, to be determined by a mail ballot in March, 1961, are:

Mrs. Rose Loving of Atlanta, Ga., and Lucille Fee of Denver, Colo.

Next vice-president for agriculture of the AVA will be R. C. S. Sutliff, chief of the bureau of agricultural education, New York State Department of Education, who will run for office unopposed. C. W. Sylvester will continue in office as treasurer. M. D. Mobley will be executive-secretary.

More than 2,300 members of the Association registered at the convention which was held in the Biltmore Hotel, Los Angeles, Calif., Dec. 5-9.

The convention awarded Outstanding Service Awards to Dr. Roy E. Simpson, California State Superintendent of Public Instruction, and Andrew D. Althouse, Supervisor of Industrial Education, Detroit, Mich. Awards of Merit were given to Dr. Edward R. Eastman, the General Electric Company, and Teodoro Moscoso.

The Ship Award, made by the commercial exhibitors of the Convention, was conferred on Samuel L. Fick, chief of the bureau of industrial education, Sacramento, Calif.

New members elected during the AVA convention to the Industrial Arts Policy and Planning Commission are:

H. O. Thomas, director of industrial-arts education, state department of education, Baton Rouge, La.; Leslie Gibbons, Colorado State University, Fort Collins; and Rupert Evans, chairman of the division of industrial education, University of Illinois, Urbana.

Dr. Evans was also elected president of the National Association of Industrial Teacher Educators. Others elected to N.A.I.T.E. posts are: Robert Worthington, chairman of the industrial-arts department, Trenton, N. J., State College, was elected vice-president of the industrial-arts section; Gordon Voss, of the Duluth

(*Continued on page* 26)

Sketches by G. E. Griefzu, Supervisor of Vocational Education, Baltimore, Md., Public Schools

By James O. Proctor
Supervisor, Vocational Education for Adults, Baltimore, Maryland Public Schools

HOW to teach a shop subject more creatively was the subject of a recent inservice training course for shop teachers in the Baltimore, Md., public schools.

Three hundred and twenty-five ideas were generated in 20 to 25 minutes by the 40 teachers who were organized in five panels. (Fifty of the best ideas appear at the end of this article.) To generate these ideas, the teachers used the "exclusively creative" technique of group ideation known popularly as "brainstorming."

"Creative thinking is taking a problem and intentionally finding a new way of solving it."

The training meeting was the twelfth session of the "Modern Trends and Practices in Industry" P.D.A. 1117 inservice training course held at the Mergenthaler Vocational Technical School. The program is sponsored by the Professional Development Committee of the Baltimore Public Schools.

Following an interesting introduction to the fundamentals of creative thinking and a very active warm-up for actual *problem thinking*, most of the mental cobwebs were brushed aside and the group was ready for practically anything, and they proceeded to prove it.

A practice session was set up on how to brainstorm a problem according to the Four Basic Rules. The rules follow:

1. *Judgment Is Ruled Out.* Criticism of ideas must be withheld until later.

"We can't increase our native talent, but we can learn to use what we have more effectively."

2. *"Free Wheeling" Is Welcomed.* The wilder the idea the better. It is easier to tame down than to think up.

3. *Quantity Is Wanted.* The greater the number of ideas, the more likelihood there is of good ones emerging from the entire cluster.

4. *Hitchiking Is Desirable.* Combine and improve ideas. Since ideas are like building blocks, group members are encouraged to suggest how others' ideas can be improved, or how two or more ideas can be turned into one idea that is better than either one alone.

The specific problem given to each panel at the training session was: "In what way can a shop subject be taught more creatively?" Originally, it was planned to give each panel a different

phase of the problem, and then to categorize the lists of suggestions under approriate headings or areas of activities. When the results were in and tabulated, a variety of breakdowns turned out to be too complicated and, even then, of only questionable value.

"Selfsatisfaction keeps us from being more creative."

The final decision was that the entire list of ideas could best serve as a grab bag: in other words, a kit of ideas from which each teacher could dip at will.

It is hoped that these suggestions will be of service to teachers in at least one way or another.

"Imagineering: let your imagination soar; then engineer it down to earth."

1. *Stimulation.* Even if a teacher merely scans the list, a more creative approach to his teaching could be induced.

2. *Adaptation.* A teacher might find many of these suggestions most serviceable as "springboards" – as ideas that can be modified, combined, and improved to become other ideas approaching the optimum.

3. *Adoption.* Out of these many ideas a teacher might want to pluck some for use substantially as they are presented here. When the original 325 ideas were closely examined, only six were considered silly, wild, or undesirable. The other ideas, with proper modification, adaptation, and planning by the genuinely creative shop teacher, it was decided, are usable. (A similar experiment was tried in Buffalo, N.Y., to find suggestions for a more creative approach to teaching American history. The group of high-school history teachers, 60 in all, generated more than 600 ideas during a 30-minute session.)

"A genius is someone who puts known facts together in an unusual way."

Concluding this article are 50 sample ideas that came from our meeting in Baltimore. All 325 of the original ideas suggested at our session are available on request. A simple test to give yourself after you have gone through the 50 ideas shown here is to ask yourself:

"Luck: when preparation meets opportunity."

1. "That reminds me, I planned to ..... this fall?"

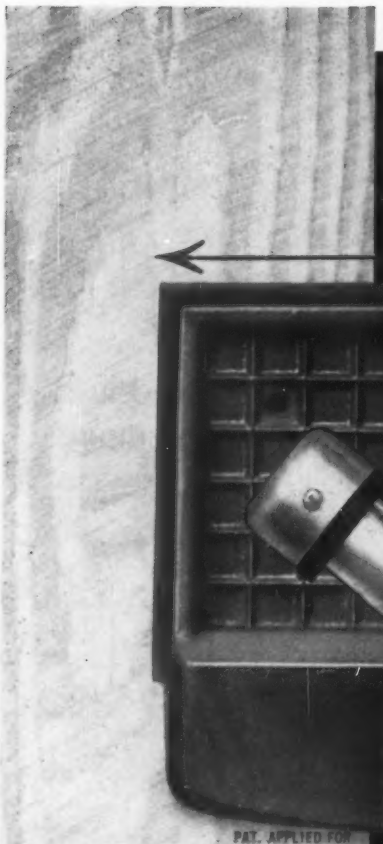
2. "How many of the ideas shown here can I modify or combine with others for use in our shop; how many can I use just as they are suggested here?"

(A statement of a problem for brainstorming and some of the ideas that resulted follow):

Problem: *"In what ways can a shop subject be taught more creatively?"*

1. Field trips (visit to industry).
2. Consultants from industry.
3. Allow students to create and carry out own ideas.
4. Career conferences.
5. Work-study.
6. Creative search by students.
7. Let student have more say in planning shop curriculum.
8. Prizes for best projects exhibited.
9. Assistant instructors– (teachers' aides).
10. More creative design in shop.
11. Student assistant in shop.
12. Student change bulletin board weekly.
13. Freedom to experiment.
14. Give each school facilities for making own visual aids.
15. Establish speakers' bureau.
16. Liaison person between shop and industry.
17. Junior achievement projects.
18. Student government in the shops.
19. Project reports with related research.
20. Arrange for related teachers to visit shop.
21. Learning to express ideas (oral reports by students).
22. Encourage home shops.
23. Industrial-arts fair or exhibit.
24. Traveling craft exhibits of different schools.
25. Projects designed so that they can be of real use for student.
26. More intimate contact between teacher and pupil.
27. Speakers and demonstrators from industry.
28. Sabbatical leave for shop teachers to go back to industry.
29. Industry awards to top class students (tool box, tools, etc.).
30. Combine two shops with two teachers.
31. Placement service for teachers in summer.
32. Father and son work day in the shop.
33. Exchange teachers with industry.
34. Exchange teachers within the school system.
35. Foreign exchange of teachers and students.
36. Interstate exchange of teachers and students.
37. Central clearing bureau for teachers' ideas.
38. Hire students for maintenance work in summer.
39. Vocational honor society.
40. More experimental shops in the city.
41. Pupil committee planning.
42. Shop fair (science fair).
43. Hidden problems.
44. Have academic or related instructors take shop courses.
45. Apprentice or intern teacher.
46. Creative thinking–brainstorming.
47. Bring current production and material information into shop lessons and project planning.
48. Send students out to bring back reports on industrial visits.
49. Get from industry insight on latest methods, procedures, and ideas of management.
50. "How would you do it?" problems. ★

New! Vertical clamping feature!



THE WILTON

7" OFFSET VISE

PAT. APPLIED FOR

It's true! Your shop can be equipped with de luxe quality equipment *and save money!* The picture shows how Wilton moved the muscle to where you need it most. The Results: You get the strength of a 10" vise, the working convenience of a 10" vise . . . all for the price and compactness of a 7" vise.

it gives you the function and strength of a 10" vise for the price & compactness of a 7" vise!

These drawings tell the story:

Conventional 7" vise. Note location of spindle and guide bars in relation to jaws.

This is how conventional 10" vise becomes a new Wilton Offset Vise . . . the amount of jaw overhang remains the same.

This is where the offset 7" vise pays off!

The offset design gives 2¾" of jaw surface beyond the left guide bar, and that's where you need it for vertical holding. The compact 7" construction conserves your precious bench space.

Write now for complete information or an obligation-free look at the most Revolutionary shop vise on the market!

WILTON

Wilton Tool Mfg. Co. • Schiller Park, Illinois

WILTON TOOL MANUFACTURING CO., INC. SS-11
9525 Irving Park Road, Schiller Park, Illinois

Please send me complete information on the new Wilton 7" Offset Vise.

NAME:_____

ADDRESS:_____

CITY_____ ZONE____ STATE_____

ORGANIZATION:_____

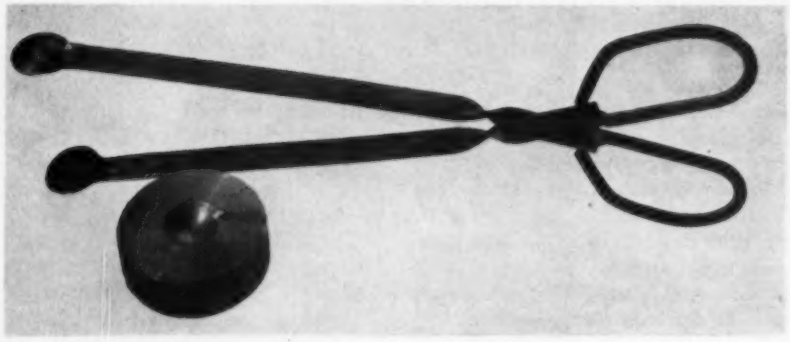
MY DISTRIBUTOR IS:_____

A simple forging project involving several operations

Charcoal Tongs

By C. J. Beitelspacher

Oakland, California, High School

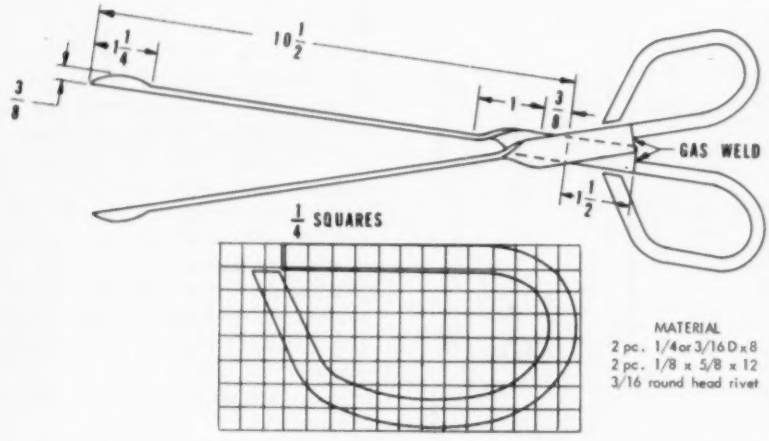


INEXPENSIVE forging projects that offer a variety of basic operations are very often difficult to find. This pair of charcoal tongs does offer this variety of operations as well as being something that Dad can use. A few suggestions about the construction, though, might save time.

Bending the handles from one piece of metal 16" long will make bending the large radius easier. Clamp 2⅜" of the stock in a vise, and pull on the other end to form the curve. Heat is not required for this operation. Do the same to the other end. The piece may now be cut in half, and the two handles are finished.

The blades require careful forging. Again, the piece can be left 24" long. This eliminates hard to handle tongs. Each end is forged to a flat area, 1¼" long and 1¼" wide, so that a 1¼" diameter circle can be scribed and trimmed.

To cup the ends to a neat, spherical radius, a dolly will be a help (as shown in the photograph). The spherical radius is about ⅜" deep and 1⅛" across. For aligning, use the ⅛" x ⅝" milled groove. Twisting the two blades to a matched position will insure exactness. The 7/64" holes should also be drilled in the assembled position. ★



Send for free examination copy of this handbook!

Here Is the Cover

Machinists' Ready Reference

Compiled by C. Weingartner, Head, Machine-Shop Department, David Ranken Jr. School of Mechanical Trades, St. Louis, Missouri

Above is the cover and below is the coupon you can send in to receive a copy of MACHINISTS' READY REFERENCE for a 30-day free examination. Priced at $1.50 — discount rates for purchases for class use — the handbook contains information on drills; tapers; screw threads; milling, shaping, and turning; gears; weights, gages, and tolerances; a host of mathematical information; and general metals information needed by advanced machine-shop and drafting students. Discount rates are: 10% on 10 to 50 copies; 20% on 51 or more.

Send in this Coupon Today!

Prakken Publications
330 Thompson Street
Ann Arbor, Michigan

Please send me a copy of MACHINISTS' READY REFERENCE for a 30-day examination period. If I adopt the book for class use and order it in quantities, I can keep this copy. Otherwise I shall remit $1.50 or return it.

Name .....

Address .....

.....

.....1/61

Explains the operation of an electronic circuit

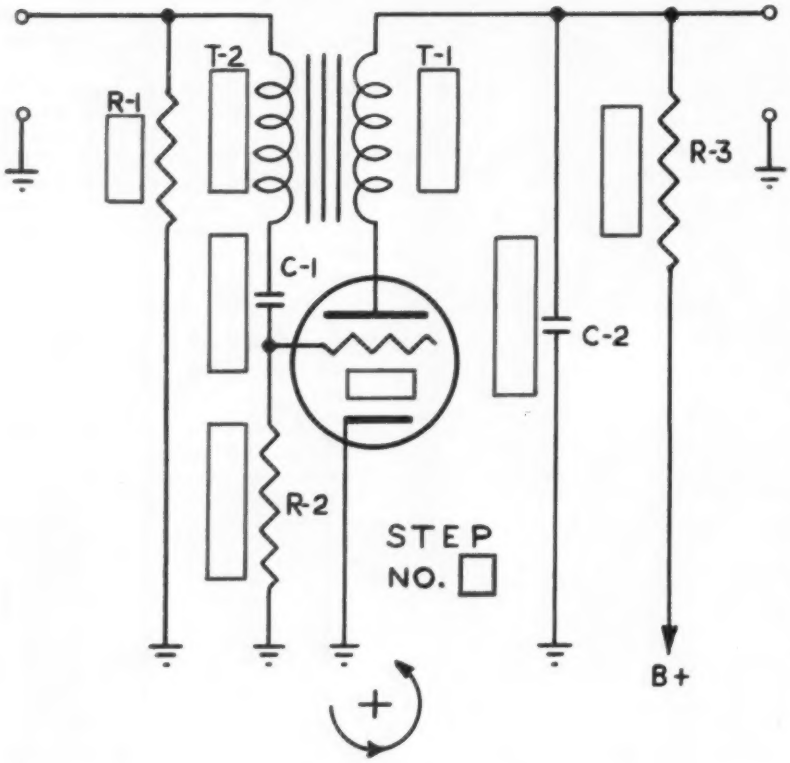
Dynamic Electronic Circuit Analyzer

By Robert P. Balin
Arizona State University, Tempe

ONE of the most difficult tasks in the teaching of electronics is that of explaining the operation of an electronic circuit in which the direction of the various currents and the polarity markings of voltage drops and charging capacitors are constantly changing. Take a vertical-sweep, blocking oscillator, for example. It goes through a sequence of four preliminary steps before reaching its two, steady, repetitive states. If an instructor, working at the blackboard, erases and changes the 23 arrows, plus signs, and minus signs required in some of the steps, the pace of his explanation may be slowed down enough to destroy the continuity of his lecture. Or, if he continually makes new additions to his diagram, even using chalk of different colors, his drawing may soon become too confusing to be useful.

Our solution is the adoption of the dynamic circuit analyzer, an electronics teaching aid which each student assembles for himself. In it, the diagram is stationary, and the circuit notations, drawn on a rotating disc, are seen through windows located at appropriate points on the diagram.

A schematic of the face of the dynamic circuit analyzer shown at top on the next page. The red rectangles and boxes are openings through which the figures, arrows, plus-and-minus signs, shown at bottom on the next page, appear. Cut them out with a razor blade.

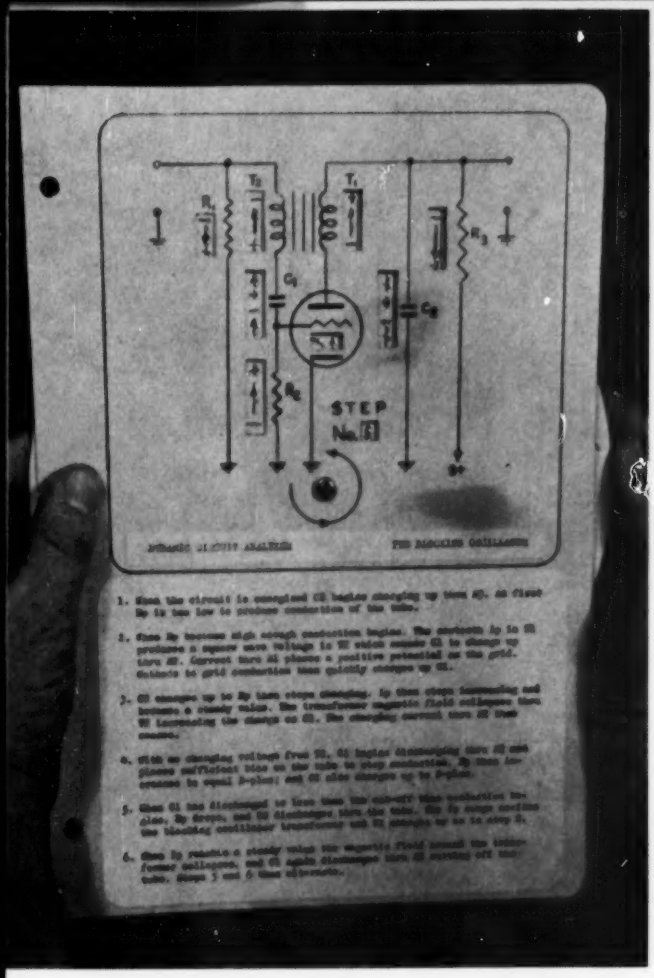


The students are given a separate mimeographed copy of the diagram and of the disc with instructions to: (1) glue each sheet to a piece of cardboard, (2) cut the windows out of the diagram with a razor blade, (3) trim the circular disc with scissors, (4) attach reinforcing rings to strengthen the holes, and (5) fasten the two parts together with an ordinary brass, round-head fastener.

Having assembled the device, the student's assignment is to write a description of the action that takes place during each of the numbered steps. Thus relieved of the laborious task of drawing and revising the diagram, the student is able to concentrate on its theory of operation. He can also refer back to previous steps very easily while studying.

After having the students work with a sample circuit in this manner, the instructor can provide the students with a suitable diagram and require them to make the notation disc for it themselves. The novelty of the assignment will generate interest.

The diagram provided by the instructor may be designed in either of two ways: have all of the windows lie within a given sector of a circle, with the number of sectors equal to the number of sequential steps required in the explanation; or draw the diagram so that each window lies a different distance from the pivot point. The notations that are seen through the windows will then be located in separate orbits around the center of the disc.



The dynamic circuit analyzer (left) assembled and ready for use. Note the arrows, plus-and-minus signs, etc., that appear here in red for clarity. The openings in the schematic appear in red at left on the preceding page. The symbols are shown below in red.

Step 3. When e_p reaches its steady state value, i_p stops increasing and the voltage across T-2 drops to zero. C-1 is now charged up to the voltage which had appeared across T-2. C-2 is now charged up to e_p.

Step 4. C-1 now begins discharging through R-2, R-1, and T-1, the negative voltage drop across R-2 being sufficient to stop conduction in the tube. C-2 now gradually charges up to B-plus voltage and thereby produces the trace portion of a sawtooth waveform.

Step 5. As the discharge current from C-1 decreases to the point where cutoff bias is no longer being produced, conduction begins and the plate voltage on the tube drops to its normal value of e_p. Because C-2 has been charged to the higher B-plus voltage, it discharges quickly through the tube, thereby producing the retrace portion of the sawtooth waveform. The surge of current i_p excites the transformer primary and C-1 again charges up to the voltage across T-2.

Step 6. After the surge current reaches a steady value, the voltage across T-2 drops to zero, and C-1 again discharges through R-2, stopping conduction in the tube. Steps 5 and 6 then alternate. ★

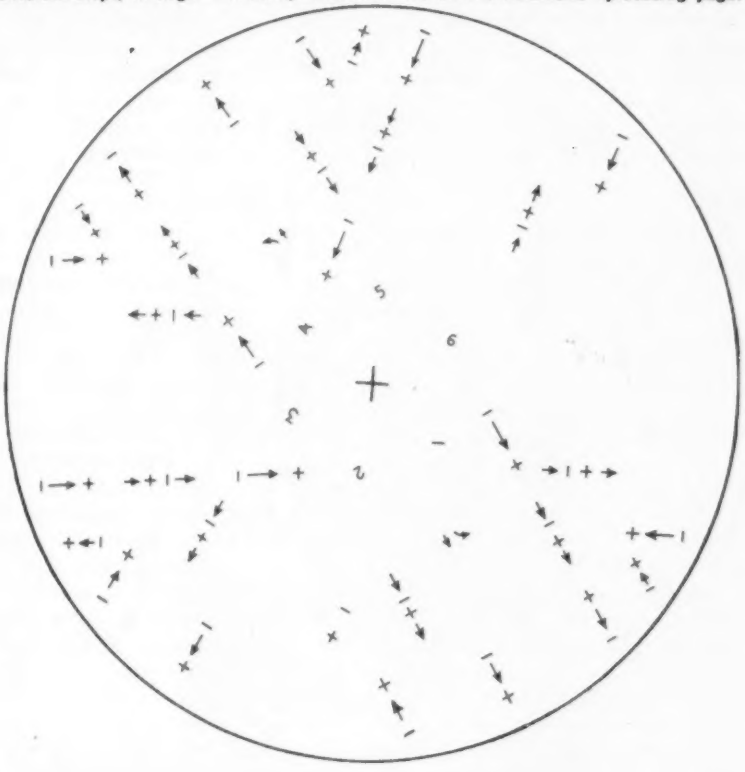
A deluxe mounting can be made by adding a cardboard back and corner spacers to allow the disc to run free. The edge of the disc can be trimmed with pinking shears, if desired, and the front and back pieces notched so that only a small portion of the disc is visible at the left-hand or right-hand edge.

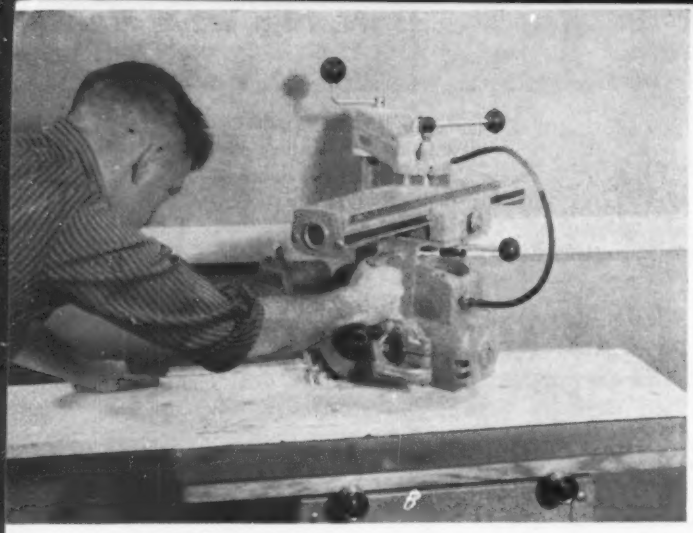
The text to accompany the circuit shown here describes the operation of a blocking-type oscillator modified for use as a vertical-sweep generator in a television receiver. The six steps in its operation follow:

Step 1. When the circuit is energized, C-2 begins charging up through R-3. At this time the plate voltage (e_p) is too low to produce conduction in the triode tube.

Step 2. As e_p increases, conduction begins and the plate current (i_p) steadily increases. This sawtooth wave of primary current produces a constant voltage output from the transformer secondary, T-2, which, in turn, causes C-1 to charge up through R-1 and R-2. Current passing through R-2 places a positive potential on the grid with the result that cathode-to-grid conduction then quickly charges up C-1.

The round disc and symbols that are part of the dynamic circuit analyzer shown above. The symbols, shown in red, pivot on the black cross in the center, then show up, at the six different steps, through "windows," shown in red on the schematic (preceding page).





"The radial saw provides the safest means of doing the work for which it was designed — cross-cutting, dadoing, and making miter, bevel, and compound miter cuts. Rotation of the blade helps to hold the work piece in position for a smooth as well as a safe cut."

This story is not always told

In Behalf of the Radial Saw

By Joseph A. Donnelly

Coordinator of Industrial Arts
Bound Brook, New Jersey, High School

ALTHOUGH an increasing number of radial saws are used in industrial-arts programs, opposition to their introduction is widespread and there is even occasional condemnation of their use.

Wholesale condemnation of the radial saw in industrial arts is unjustified. Like any other tool, it can be misused. Properly used, however, it can contribute to the value and efficiency of the training provided in industrial-arts courses.

Opposition to this tool seems to be based on three points:

1. It is dangerous.
2. Full use of the tool requires too much lost time and motion in making special setups and in supervision.
3. It is a professional's tool and, therefore, has no place in the school except in vocational courses.

Safety

The radial saw provides the safest means of doing the work for which it was designed – cutting across the grain, dadoing, and making straight, miter, bevel, and compound miter cuts. Because the work piece is positively positioned against the fence and not moved during cutting and because rotation of the blade actually increases the force holding the piece in position, kickback – a major cause of saw accidents – is virtually impossible during cross-cutting.

To a person unfamiliar with the machine, seeing a portion of the blade exposed may make the tool appear dangerous. Despite this visible portion of the blade, it is almost impossible for an operator to get his hands in the way of the blade if a proper blade guard is used. This, of course, should be mandatory in all school shops.

The antikickback guard – the rod-and-fingers arrangement at the front of the blade – is designed to prevent kickback in ripping operations. In addition, this safety device should be utilized for cross-cutting by having the kickback fingers raised approximately ¼" above the work.

Student Operators

A shop instructor will naturally observe the same precautions with a radial saw as with other tools. It is understood that no student should operate any tool – including the radial saw – without thorough training in the techniques to be used and under supervision appropriate to the student's aptitude and skill.

Most radial saws are equipped with positive stops at 90° and 45°, right and left. When making angle cuts at other positions than these, students should be required to obtain permission and the instructor should give special supervision to the setting of the angle. (Incidentally, the accuracy of the postive stops should be checked periodically and adjusted for wear if the model permits adjustment). Special permission should also be necessary for a student to cut any board wider than the table from fence to edge. (This cut is made either by moving the fence back or by turning the board after cutting half way through the piece. If the tool does not have an overarm with turret arm action, which permits full-table capacity at all angles, lines should be painted on the table to show the limits of cutting width as the armtrack is pivoted. This width will be less on the left than on the right because the blade of a radial saw is several inches to the left of the overarm.

Additional Safety Precautions

Additional safety measures are worthwhile. A magnetic starter, which prevents turning on the tool from a remote power switch, is advisable as it is on all power tools. A safety-return spring attachment, which returns the cutting head to its original position when the operating handle is released, offers an additional advantage.

Many teachers using radial saws like an extension table on either side to help support long boards while they are cross-cut. With extensions, a second operator is never needed to support long pieces, a practice that can cause accidents. Extensions may be wooden tables or roller tables which are accessories with some radial saws.

Full Use

The radial saw is not an all-purpose tool, at least not for the school shop, and in this sense it is true that many of the secondary operations are not practicable in an industrial-arts program. There is a great deal to be said for limiting the tool to various cross-cutting operations. Certainly, the tool is not a substitute for a tilting-arbor table saw or for any other single-purpose tool. If only one saw can be included in the school-shop budget, the table saw is the obvious choice.

This does not mean that the radial saw cannot be an important tool, both as a means of instruction and as a work horse in the school shop. Well over half of sawing is in cross-cutting operations, and no tool performs these better or more safely than a

radial saw. In fact, its value could very well be summed up as follows: Any shop that requires more than one saw should have a radial saw for cross-cutting.

Secondary Operations

What about secondary operations? Many manufacturers list a variety of operations that can be performed on the radial saw. Such operations include ripping, making tongue and groove joints, cutting moldings, drilling, shaping, routing, disc sanding, grinding, etc.

While a shop instructor may find occasional advantage in performing some of these operations with a radial saw, they can usually be performed better, with less lost time and motion in setting up, on other tools.

Safe Ripping

Ripping may be partially responsible for the undeserved reputation for danger of the radial saw. Several factors make the radial saw less safe for ripping than a tilting arbor saw.

If the radial-saw operator should feed the stock from the wrong direction, the cutting action of the blade will pull the stock through and in all probability stall the motor. Most radial saws, however, have a prominent arrow indicating the direction of blade rotation as well as directions: "Do not rip from this side."

Second, when ripping narrow stock, the operator pushes the stock forward and against the fence. As the cut is being completed, the motor may interfere and the operator's hands may come precariously close to the blade. There is, however, a safe method of ripping narrow stock, which is to use an auxiliary table with front fence and a ripping pusher.

Third, it is more difficult to feed stock over a wood table, which may have been repeatedly scored by various miter cuts, than over the metal top of a circular saw. However, if a smooth-surfaced auxiliary table is placed over the regular table and used for ripping only, this objection will be overcome.

Certain other operations such as grooving, rabbeting, and making mouldings, in which the saw head is turned 90 degrees, can be made fully safe by use of a shop-made guard that completely covers the blade, leaving only a channel through which strips are fed.

A teacher might wish students to perform a variety of other operations on the radial saw just to give them wider experience in making tool setups. Only the particular teacher can decide whether the time spent in making special setups is worthwhile in each instance.

A Professional's Tool

The argument that the radial saw is a professional's tool and, therefore, has no place in the school shop is just as true of every other tool used in schools. Builders and maintenance and shipping departments of industry generally use the radial saw more than any other saw, but *this is an argument for the use of the radial saw, not against it.*

Almost every shop teacher agrees that one of the purposes of industrial-arts education is to give students some insight into industrial methods and the radial saw helps do this.

In fact, no other tool lends itself so readily to a demonstration of a production operation. It is particularly useful in "production" work when cutting lumber to rough size for the initial projects of a beginning class. This type of mass cutting is almost essential for short-term, industrial-arts classes.

The facility with which the radial saw does the work for which it is designed actually enables students to do more and to tackle more ambitious projects whatever the length or level of the course.

Early Use

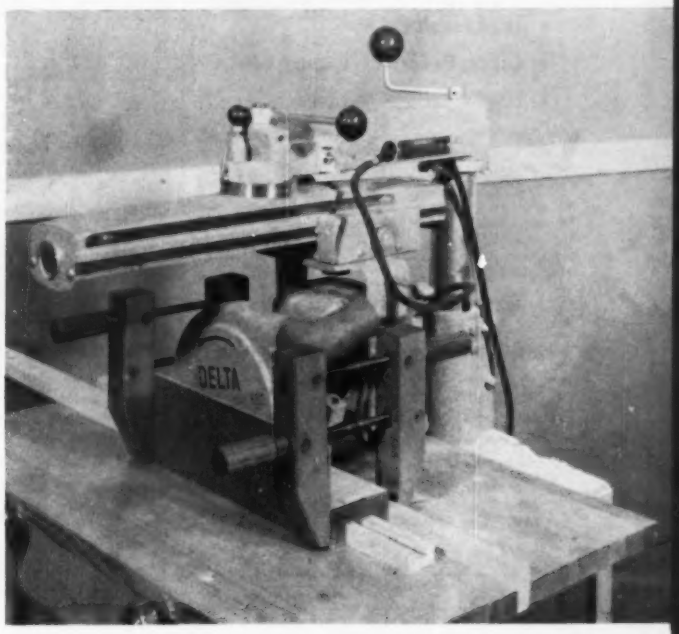
From the point of view of safety and ease of operation, the radial saw hardly needs the professional's experience or skill. It may be one of the first tools students learn to operate. When a model with controls at the front of the unit is used, the radial saw is as easy to set up as any tool in a school shop – easier than many.

It is quite conceivable that its use could be safely and profitably introduced to seventh-grade and eighth-grade students.

Leisure Time

Every teacher agrees that industrial arts should help people make better use of their leisure time and become better home craftsmen. Since use of the radial saw, often as a supplementary tool, is growing in home workshops just as in the schools, training in its proper use in the school has a direct bearing on future leisure-time activities.

The most likely explanation of the "professional's-tool" argument against the radial saw is that it is a hangover from the days when many shop teachers looked askance at all power tools. Some teacher may still feel that a job done by hand, or done "the hard way," is a job that is done better. Any teacher who is himself a craftsman knows that there are some things that can be done better with power tools than without them and that a good power tool, well suited to the purpose for which it is used, will improve the quality of the work and the skill of the workman. To carry this argument a step further, a tool specially designed for a particular job is usually the best means of doing the job. This is true of the radial saw. ★



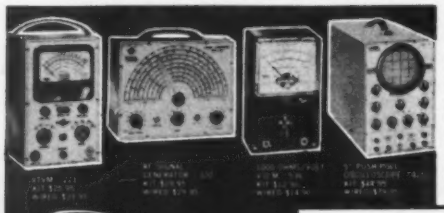
Grooving, rabbeting, and making mouldings can be done safely by using an improvised guard that covers the blade completely, leaving only a channel through which strips are fed (right).

EICO KITS give your students:

hand-wiring throughout + advanced circuitry + beginner-tested manuals = better knowledge of electronics

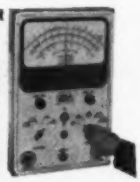
performance proved by 100,000 students

Your students learn better "by doing." With their own hands, they actually build professional quality TV/radio/electronic test instruments, hi-fi components, amateur radio gear, and transistor radios . . . Following simple, step-by-step instructions (including pictorial diagrams and schematics plus data on color codes, tools, and soldering), they completely assemble the latest performance-proven designs and circuits . . . And they have the satisfaction of knowing that what they are working on is not merely a training aid but a fine, useful piece of equipment, in every respect exactly like a factory-wired unit.



EXCLUSIVE VTVM DYNAMIC DEMONSTRATOR ONLY $10.

Simulates EICO #221 VTVM in all functions & ranges. Helps you teach the use and reading of the VTVM. Giant 13" meter scale. 14¾" w. x 23" h. x 3½" d. Easily viewed on desk or wall. Steel cabinet, aluminum panel.



FREE ELECTRONICS WALL CHART of official IRE-EIA symbols. Ideal for classroom instruction. EICO, 33-00 N. Blvd., L. I. C. 1, N. Y. SS-1

PLEASE SEND FREE ☐ Wall-Chart, catalog, & name of neighborhood supplier. ☐ Stereo Hi-Fi Guide. ☐ Short Course for Novice License.

NAME

ADDRESS

CITY STATE

Add 5% in the West

NEW NAME-PLATE KIT

H. T. BARTRAN

- Inexpensive
- Gives Practical Experience
- High-Interest Project

This Cast Name-Plate Kit contains a 94-piece font of professional pattern letters that can be used over and over again, and an attractive 2" x 6" border tablet pattern.

No additional equipment is required; only pennies for material. Students use present metal melting and molding equipment to cast lead, bronze, or aluminum nameplates for doors, desks, mail boxes, machinery, etc.

Complete Kit: $8.95 postpaid.

Pattern letters for foundries since 1863

H. W. KNIGHT & SON, INC.
60 Lane Street, Seneca Falls, N. Y.

Please send.....Pattern-Making Kits. Enclosed is check/money order for $..... . (No COD)

School.....

Address.....

City.....State.....

Attention:.....

Teach *Modern Wood Finishing* with the famous SEALACELL PROCESS

The "Wipe-on" Finish that

- Eliminates dust troubles
- Requires no brushes
- Protects and preserves wood
- Needs no sanding between coats

SPECIAL OFFER

Our new pocket size Sealacell Penetrating Process Wood Finishing Manual is free on request. Additional student copies sent free with your order of materials.

GENERAL FINISHES SALES and SERVICE CO.

1548 West Bruce St. Milwaukee 46, Wis.

For beginning crafts

Cart for Leatherwork

By Lyle P. Soeteber and William H. Wood

Clark Junior-High School, East St. Louis, Illinois

TOOLS and supplies for special areas are always problems, it seems, in any general, industrial-arts program.

In our general, junior-high-school, industrial-arts program, we have two large general shops. One is for woodworking and the other is for general metals. In addition, we have a drawing room that is used part time. Eighth grade shop students work in four exploratory areas: woodworking, general metals, drawing, and crafts. And, finally we have arrived at the nub of our problem: There is no craft room in our shop setup.

For a portable tool and supply cabinet for leather and plastics, we purchased two service carts – 16" x 30" x 32" – and modified each to suit our needs.

We inserted a center shelf and closed in the back and ends with hardboard for a "plastics" cart. The front has two sliding doors.

For the leather cart, we designed an "A" frame (photo below). The top tray is used for scrap leather. Supplies are stored below. On the plastic cart, we attached a ¼" piece of pegboard for a back. The tray, then, is used for buffs, rouge, files, clamps, etc.

Each cabinet has a hasp lock.

We feel this cart idea has great possibilities, particularly in an elementary-crafts program where a teacher moves from room to room. ★

HERE'S PROOF OF PERFORMANCE:

"My eight Clausing 6328 Lathes are the finest lathes for instructional use I have ever seen. Their safety features, ruggedness and ease of operation make them tops in their field. You offer so many more features than any other lathe that I would vote for a Clausing every time."

Harold Burgan, Spokane, Washington

CLAUSING 6300-series 12¾" LATHES

are "TOPS for safety... ruggedness... ease of operation"

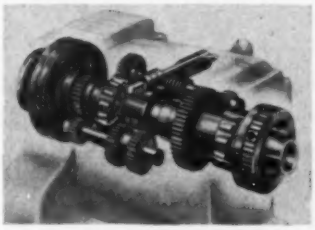
Harold Burgan's statement above is typical. Instructors everywhere report Clausing Lathes set the standard for safety, rugged construction, ease of operation and Value! Here are a few reasons why:

Headstock, apron and quick-change are *totally enclosed* . . . inquiring fingers can't get into these danger zones, nor can dirt or chips . . . all gears and shafts travel in a bath of oil. All controls . . . including those for back gear engagement . . . are located outside machine. Spindle nose is tapered Key-lock . . . eliminates danger of chuck run-off on braking or reversing.

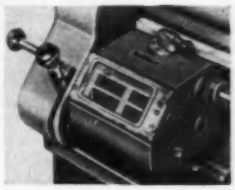
Flame hardened bed ways for longer wear are standard equipment *at no extra cost.* Spindle is forged steel, turns on Timken "Zero-Precision" tapered roller bearings. Apron and quick-change gears are protected by safety devices . . . lead screw has easy-to-replace shear pin.

Drive is underneath . . . no exposed belts or pulleys. Has heavy-duty ball bearing countershaft. Two V-belts drive the spindle . . . belts are outboard for easy replacement.

Get the facts and compare with any other lathe in its class . . . feature for feature, dollar for dollar. We know you'll agree Clausing 6300-series are today's outstanding values . . . *the* lathes for *your* shop. Write for illustrated literature today.



Enclosed construction of headstock provides greater rigidity, safety . . . longer service life. All gears, shafts and bearings travel in a pumped bath of oil.



Quick-change box, too, is totally enclosed and gears and shafts turn in bath of oil . . . another important safety and long-service-life feature exclusive with Clausing in lathes of its class.

CONDENSED SPECIFICATIONS

Swing over bed	12¾"
Between centers	21½", 33½", 47"
Hole thru spindle	1⅜"
Thread range	54 selections, 4 to 224 Standard right or left
Motor recommended	1 or 1½ HP, 1 or 2 speed

CLAUSING DIVISION, ATLAS PRESS COMPANY

1-116 N. PITCHER ST. • KALAMAZOO, MICHIGAN

A short, short story

Embers Need Fanning

By Simon Walters
A Shop Teacher, Anywhere, U.S.A.

BLACK hair, swarthy complexion, untidy clothes, a vacant expression masking his large dark eyes, Alvin sauntered into the classroom. He handed his program slip to the teacher.

"New in this school?"

"Yeah."

"Ever have auto shop before?"

"No."

"Why did you sign up?"

"They gave me it."

"Do you want it?"

"Yeah."

The teacher studied the boy a moment, trying to size him up. He liked to think he had a flair for making penetrating judgments of character based on minimum clues. "Do you know anyone here?" the teacher asked.

"No."

"Sit over there, Al."

During the next few days the teacher observed the new boy. "He's no worker," he concluded. "Not much of an intellect either. Just another one of those who are putting in their time," he muttered wearily to himself.

In the shop, while others were busy, Alvin stood with his hands in his pockets. He made no effort to help. Asked no questions. Made no comments. Just stood there. Impatiently the teacher spoke. "Now look, boy, you won't get any credit for standing around. We work in this shop."

"What should I do?"

"Why don't you help Shaffer over there," pointing across the shop toward a boy sloshing solvent on a greasy fuel pump.

A few minutes later Alvin had his hands in solvent, helping the other boy. "Take this fellow under your wing, Shaffer," the teacher said as he walked by. "Show him how to work."

From deep inside the boy, a wild pride surged upward, spilling out of his eyes, bursting from his lips. "No one has to show me!" he exploded.

Startled, the teacher stared at him. For a moment the boy's eyes were like glowing embers, then slowly they lost their fire and once more became expressionless.

Thoughtful now, the teacher walked away. "I'm blind," he said to himself. "And stupid, too. There's fire there. Something's alive."

The boy caught his eye. "I don't need any help," he said, and the pride was in his eyes again, and something else; the hungry, searching look of a half-starved puppy. "You got another of them pumps I could work on by myself?" he asked quietly. ★

Both NEW and DIFFERENT SHELDON 15" PRECISION LATHES

NEW

New. Revolutionary double-box Headstock (Pat. Pend.)
New. "WORK-HOLDING ONLY" Spindle.
New. Single-Shift Back Gear Lever on Headstock.
New. Headstock and Apron running in oil.
New. 1⅛" Hole through Spindle.
New. 60-pitch Gear Box with built-in Lead Screw Reverse.
New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.
Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.
Different. Two independent clutches in apron for selecting power feeds.
Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.
Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

Send in Coupon for full Information

SHELDON MACHINE CO., INC., 4260 No. Knox Ave., Chicago 41, U.S.A.

Gentlemen: Please send me information on items checked.

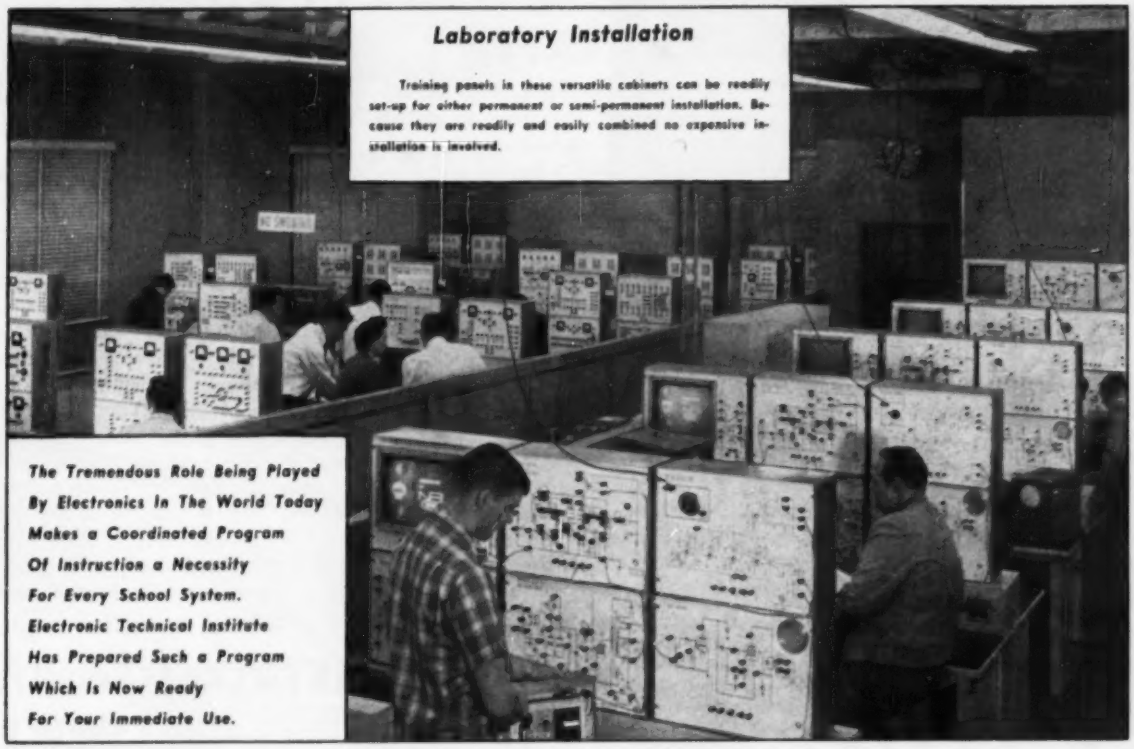
☐ The NEW and DIFFERENT SHELDON 15" Lathes
☐ Sheldon ☐ 10" ☐ 11"
☐ 13" Lathes
☐ 11" and 13" Variable Speed Lathes
☐ High Speed Turret Lathes
☐ Sebastian 13" and 15" Geared Head Lathes
☐ Horizontal Milling Machine
☐ Sheldon 12" Shaper
☐ Name of Local Dealer
☐ Have representative call

Name ..... Title .....
School Name .....
Street Address .....
City ..... State .....

NOW! A COMPLETE INSTRUCTIONAL PROGRAM for YOUR SCHOOL IN ELECTRONICS

COMPLETE EDUCATIONAL PROGRAMS FOR ALL LEVELS OF LEARNING

40 DEMONSTRATION AND LABORATORY TRAINING UNITS NOW IN PRODUCTION



Laboratory Installation

Training panels in these versatile cabinets can be readily set-up for either permanent or semi-permanent installation. Because they are readily and easily combined no expensive installation is involved.

The Tremendous Role Being Played By Electronics In The World Today Makes a Coordinated Program Of Instruction a Necessity For Every School System. Electronic Technical Institute Has Prepared Such a Program Which Is Now Ready For Your Immediate Use.

ELECTRONICS THEORY BY PHOTO-SOUND

(Books, Records, Problems, Tests, Lesson Plans, and Experiments)

Book	Title of Unit	No. of Records	Price Complete
1	Static and Current Electricity, Ohm's Law	2	$3.50
2	Batteries Used in Communications	2	$3.00
3	Power, Capacitance and Inductance in D.C. Circuits	2	$3.00
4	Inductors in Series and Parallel, D.C. Motors	2	$3.00
5	D.C. Meters	2	$3.00
6	A. C. Theory, A. C. Meters	2	$3.00
7	Inductance and Capacitance in A. C. Circuits	2	$3.00
8	Impedance	2	$3.00
9	Transformers, Relays and Protective Circuits	2	$3.00
10	Parallel A. C. Circuits and Power Factor	2	$3.00
11	Diode Tubes and Power Supplies	2	$3.50
12	A. C. Motors and Generators, Three-Phase Motors	2	$3.00
13	Triode Tubes, Audio Amplifiers and Reproducers	2	$3.50
14	Vacuum Tube Characteristics	2	$3.00
15	Resonant Circuits and Basic Oscillators	2	$3.50
16	Oscillators	2	$3.50
17	Basic Transmitter Circuits	2	$3.50
18	Antennas, Transmission Lines and Logarithms	2	$3.50
19	Modulation	2	$3.50
20	Filters and Special Transmitter Circuits	2	$3.00
21	Detectors and Receivers	2	$3.50
22	Audio Equipment and Decibels	2	$3.50
23	Oscilloscopes	2	$3.50
24	VTVM and Frequency-Measuring Equipment	2	$3.50
25	Frequency Modulation Principles	2	$3.00
26	Reception of Frequency-Modulated Signals	2	$3.00
27	The Video System	4	$6.00
28	The Video Transmitter	4	$5.00
29	The Video Receiver	4	$6.00
30	Radar	8	$9.95
31	Mathematics for Electronics		$5.00
32	Slide Rule		$2.00
33	Computer Digital Elements		$3.00
	FFC Novice Course (Complete)		$29.95
	Code Course (Complete)		$33.00

TEACHING AIDS INCORPORATED

POST OFFICE BOX 3527 — LONG BEACH 3, CALIFORNIA

KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

Use Masonite, Not Wood

We have found that a strip of Masonite makes a better spline for a spline-miter joint than a strip of wood because the Masonite has no grain and has a high breaking strength.—*C. Wayne Close, Glendale, Ore.*

In Lieu of Chalkboard Space

One method of overcoming a lack of chalkboard space in the shop is to use white butcher paper and a felt pen for illustrating or making a point. The drawing or information is drawn or written on the butcher paper, which can be taped or thumbtacked to a convenient wall. At the conclusion of the lesson, the paper can be removed and stored in a mailing tube for future use.

If a number is assigned to each sheet, and a master index is maintained, it is a simple matter to locate items when needed.

Disposable felt pens, which are available in several colors, can be used to emphasize particular parts of a lesson. Heavy, pressed-paper tubes, about 4" in diameter, are obtainable free very often from linoleum supply dealers. These tubes are about 10' long, and they can be cut to desired lengths.—*Gene Kampa, Danville, Calif., Union School District.*

Converting to a New Style

You can easily convert your old circular-saw guard to a modern guard, one which will provide good illumination and visibility for the operator.

Saw out the desired section of your old guard with a small, utility, keyhole saw. Then cut out the plastic section from 1/8" acrylic, making certain to allow for bending.

The plastic can be formed easily right on the guard using a heating lamp to soften the material. Be sure to use leather gloves when doing this. When the forming is finished, fasten the plastic to the guard with small machine screws placed about 1½" apart. If the forming is done carefully, distortion is held to a minimum.—*Thomas Nowacki, Poland, N.Y., Central Rural School.*

For Masking Acid-Etch Work

Con-Tact, a selfadhesive sheet plastic, which can be purchased from almost any furnishing, department, or "five and dime," is excellent for masking acid-etch work. It is impervious to hydrochloric acid and to nitric acid. It lends itself, moreover, very nicely to design cut-out, and it sticks like, ah, well—glue.

A lineal yard, 18" wide, costs well under $1. We now use liquid acid resist only for protecting the back and edges of the metal to be etched.

Incidentally, the same material is excellent for tool silhouettes or tool panels. The color red stands out boldly and reveals missing items.—*Peter Savino, Livingston, N.J., High School.*

ly and reveals missing items.—*Peter Savino, Livingston, N.J., High School.* ★

Dust

TRAP THIS DANGEROUS ENEMY with

Hammond DUSKOLECTORS

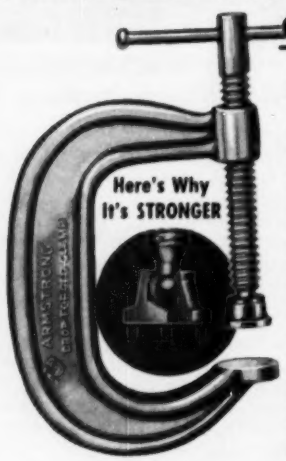
Dust is a serious problem in most industrial plants. With Hammond DUSKOLECTORS you trap this dangerous enemy at its source before it can harm the health and efficiency of your employees and damage valuable machinery. Your cleaning and painting costs will also be reduced. Hammond DUSKOLECTORS offer you the best and most economical solution to your dust problems. Write today for catalog with helpful engineering information and interesting installation views.

"A MUST FOR DUST!"

Hammond Machinery Builders INC.

1676 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

New ARMSTRONG Swivel Pad can't come off



Call your ARMSTRONG Distributor

Your ARMSTRONG Distributor can offer delivery from stock on this "400-Series" deep throat, drop-forged "C" Clamp with the new Ball-joint Swivel Pad. He also carries in stock the other styles of clamps in the ARMSTRONG Line—the broadest line of drop forged "C" Clamps.

NOW ARMSTRONG deep throat "C" Clamps have the new (Pat. apd. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer—yet the pad is free to swivel through an arc of approximately 40°.

ARMSTRONG BROS. TOOL CO., 5252 W. Armstrong Ave. CHICAGO 48, ILLINOIS

INSTRUCTION is MORE EFFECTIVE in the Shop Equipped with . . .

King

BERKROY

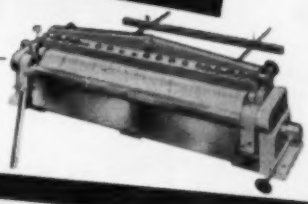
PRODUCTION TOOLS

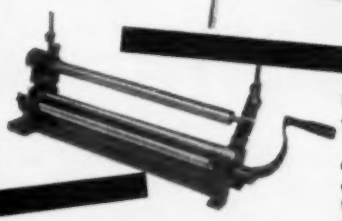
Rugged • Dependable • Designed for Industry

12" BRAKE
20 ga. capacity.
SHEAR with CLAMPING HEAD
Cuts circles, contours.

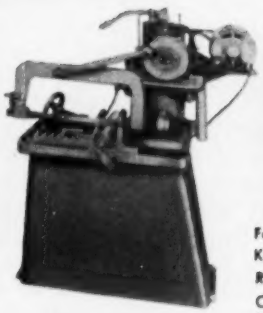
King/BERKROY Sheet Metal
SHOP-ON-A-BENCH
Complete unit —
5 tools on heavy steel stand:
NIBBLER-SLITTER
12" throat capacity.
HAND PUNCH
Uses dies, blades, punches. Press-fits, too.
12" SLIP ROLLS
Forms cylinders, curves.

King/BERKROY
BOX & PAN BRAKE
24" - 30" - 36"
Locks to desired angle—
16 ga. capacity—
needle bearings—
2½" pan depths.





King/BERKROY
SLIP ROLLS
12"-18"-24"-30"-36"
Oilite bearings—
enclosed gears—
finger tip adjustment—
wire rolling grooves.



For Graphic Arts . . .
King/BERKROY
RUBBER STAMP PRESS
Compact, safe—110 V-AC.
Provides practical training in making rubber stamps at low cost.

King/BERKROY
HIGH-SPEED HACKSAWS
Two models: 4" x 4" and 6" x 6" capacities—depth limit switch.

For complete catalog information, write:

King MACHINE & MFG. CO.
Since 1910
1171 East 32nd Street
Los Angeles 11, California

*turn your budget into a lifetime investment

specify

functional...
flexible
lifetime quality **STEEL**

stacor

MULTI-STUDENT DRAWING UNITS

from the famous **FLEX-MASTER** *line*

- **ECONOMICAL:**
- **NO MAINTENANCE;** last a lifetime!
- **SPACE-SAVING:** 3 basic cabinets plus desks serve 6 to 12 students **at each unit.**

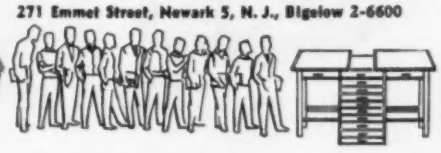
EXCLUSIVE STACOR FEATURES:

- Open working surface
- Horizontal storage of boards up to 20" x 26" plus T-Square, tools, other material
- Drawers have individual locks . . . are masterkeyed
- Heavy gauge steel
- Hard-baked enamel finish in decorator colors: Beige, Mist-Green & Gray
- Permanence
- Minimum upkeep

Stretch your budget! Specify STACOR Lifetime Quality Steel Drafting Equipment. Write today for New Complete Catalog, showing all combinations to meet your specific requirements.

STACOR EQUIPMENT COMPANY
manufacturers of lifetime quality equipment for schools, libraries & industry
271 Emmet Street, Newark 5, N. J., Bigelow 2-6600

*lowest cost per student



AVA Convention . . *from page* 11

Branch of the University of Minnesota, was elected vice-president of the trade and industry section; Calvin Cottrell, of Ferris Institute, Big Rapids, Mich., was elected secretary-treasurer of the association.

Officers for the coming year of the National Association of Trade and Industry Supervisors are:

Dr. Joseph Nerdern, chief of the bureau of technical institutes, Hartford, Conn., president; W. M. Hicks, state supervisor of trade and industry, Atlanta, Ga., vice-president; and Von H. Robertson, state supervisor of trade and industry education, Salt Lake City, Utah, secretary-treasurer.

Highlights of some of the major addresses delivered at the convention in Los Angeles follow:

Howard Pyle, former assistant to President Eisenhower and one-time governor of Arizona, said, "Education and hard work are the weapons challenging all component parts of United States life. We should be delighted at this significant contest. . . . If we are willing to accept the challenge and revel in the opportunity, the next 20 years can be tremendously productive. If, however, we refuse to believe the communist challenge, we will be in worse trouble than we were at Pearl Harbor. . . . We need first, a new kind of seriousness on the part of students; second, more recognition of the facets of vocational guidance; and thirdly, 'drive'."

Samuel M. Brownell, superintendent of Detroit, Mich., public schools, said, "Planning vocational programs to fit community occupations is less and less realistic in meeting the needs of local youth. Fewer and fewer people continue to live in the same areas all of their lives. More and more job opportunities cause individuals and families to move about from locality to locality, state to state, and nation to nation. Vocational preparation must truly be preparation for the world of work. . . . Employers cannot afford to employ the inexperienced and therefore look to the schools as the agencies which should prepare individuals who are ready to begin work with a minimum of on-the-job training or orientation. Therefore, schools must upgrade preparation for work at all levels of ability, including low-skill preparation for mentally retarded and reluctant learners. . . . Vocational-education programs and attitudes toward vocational education have not kept pace with changes in the world of work, especially in the cities. . . . And the programs we now have are often less effective, in the way they are conducted, than they would be if we utilized new procedures that have been proven to be effective. . . . Vocational education cannot be separate from or an appendage of the secondary school. It must be accepted that all education contributes to success in the world of work if we are to have balance to the education of a pupil."

Mark Nichols, Utah State director of vocational education and who spent three weeks in Russia during April and May of 1960 studying evolving Soviet patterns of vocational education, said, "Upon arriving in Moscow we were impressed that education is about the first order of business in Russia, and big business it is. Our Russian guides informed us that 32 percent of governmental expenditures are diverted into education. This cannot be compared with United States educational expenditures, however, because it includes student stipends and payments for cultural and recreational activities in addition to actual school costs. But make no mistake about it, Russia is in the school busi-

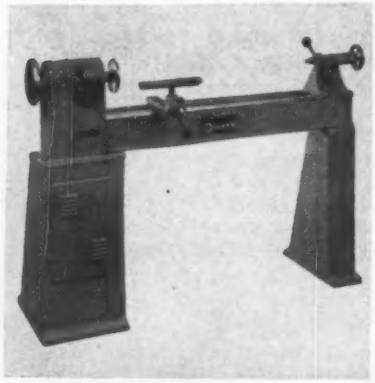
"OLIVER"

MACHINERY OF QUALITY FOR SCHOOL SHOPS

It's Portable!

No. 585 Oilstone Tool Grinder is compact, highly efficient small tool grinder

Attach to any outlet; move it where most convenient. Grinds and sharpens woodworking tools quickly — keeps tools in top working order. Has good safety features. Size 28"x25".



Popular new 167 Lathe has new design, offers greater strength, more capacity, maximum safety.

Woodworking-metal spinning lathe. Features welded steel construction. Full 45" capacity between centers. Mechanical interlock with electrical control system permits starts at slow speed only.

OLIVER MACHINERY COMPANY

OLIVER EQUIPMENT for SCHOOL SHOPS
Saws, Band Saws, Jointers, Sanders, Surfacers, Tool Grinders, Mortisers, Shapers

WOODWORKING MACHINERY
Grand Rapids 2, Michigan

ness and in a big way! . . . Education in Russia is a terrifically competitive enterprise. Examinations are the chief criteria in determining the occupational direction of youth. Examinations are the basis for siphoning off a high percentage of young people into trade schools at the seventh year. . . . Are we to conclude that Russia's educational education procedures are better than ours today? . . . *"No."*

The convention decided at its final general session that the 87th National Congress be requested to amend Title I of the George-Barden Act "in such manner as to increase to $60 million the authorizations for the several phases of equipment and supplies that will become the property of the states"; that "at the appropriate time

happenings in industrial education

New Printing Scholarship

A NEW scholarship trust fund for the study of printing management has been established by Kimberly-Clark Corporation, Neenah, Wis.

The new scholarship program will begin its first year with one scholarship valued at $1,000 for study at Rochester, New York, Institute of Technology. Each year an additional scholarship will be awarded up to a total of four.

The scholarships are being granted under the auspices of the National Scholarship Trust Fund of the Education Council of the Graphic Arts Industry, Inc. Currently 28 students are now in college under this program.

The Kimberly-Clark fund is the first designed to help prepare young people for executive and professional career opportunities, rather than craftsmen, in the graphic-arts industry. request Congress to amend provisions of the area Vocational Education title of the National Defense Education Act of 1958 in such a manner that funds may be used for developing area programs of Vocational Education in all recognized occupations essential to our nation's economic well-being"; that Congress be urged "to enact appropriate legislation to provide education and training for veterans who first entered the military service after January 31, 1955."

The 1961 AVA convention will be held in Kansas City, Mo. ★

IA Conference Meets

THE 47th annual meeting of the Industrial Arts (Mississippi Valley) Conference was held November 10-12 at the LaSalle Hotel in Chicago with about 75 members and guests in attendance. Following the customary pattern of short presentations of topics with group discussions following, the first subject considered at the meeting was "Changes in Content in Industrial Arts to Meet the Needs of a Technological Age," with presentations by M. Ray Karnes, University of Illinois; W. A. Klehm, Eastern Illinois University; N. B. Grinstead, Central State College, Warrensburg, Mo.

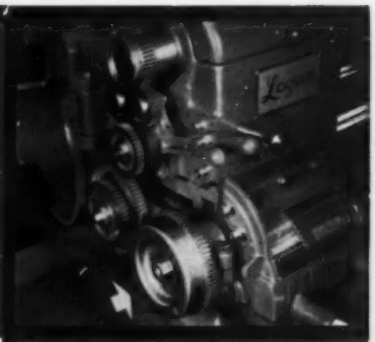
H. H. London, University of Missouri, and Lawrence C. Secrest, Northern Illinois University, described their recent visits to Russia, with each having different reactions to the Russian scene. The topic, "What Are the Functions of Professional Associations?" was discussed by Lawrence W. Prakken, Editor, SCHOOL SHOP; C. H. Groneman, Texas A & M College; and Lloyd P. Nelson, Ball State Teachers College, Muncie, Indiana.

(*Continued on page* 28)

new safety feature!

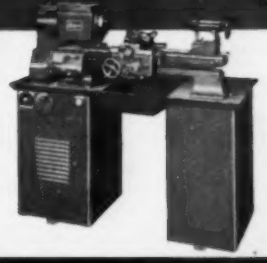
Logan

Automatic Safety Gear now standard equipment on 10" and 11" models



12" Lathe

All Logan 11", 12" and 14" lathes, as well as models 1825 and 1875 (*shown*) 10" lathes, now offer positive overload protection without additional cost. Exclusive Automatic Safety Gear absorbs shock of sudden overloads when threading, preventing gear damage from spindle to gear box. Also protects all gears in gear box up to 52 threads per inch. The combination of this Safety Gear and spring-loaded lever-operated clutch in apron gives the same protection for corresponding feeds. Can be factory installed on other models of new 10" and 9" quick-change lathes. Available for present Logan quick change lathes: $10 for 9", 10" and 11" sizes, $15 for 12" and 14".



10" Lathe

For full model details and evidence of Logan's *low upkeep* and *better service*, see your Logan dealer, or write for catalog.

LOGAN ENGINEERING CO., Dept. E-161, 4901 Lawrence Ave., Chicago 30, Ill.

HOW
30,000 teachers introduced their pupils to the fascinating world OF LIGHT & SIGHT

"Your 'Working with Light' packet offers much more in the area of science of lighting than the ordinary project book used in shops. I'm happy to see more of this 'why' and 'how' scientific approach."

This comment from a shop teacher is typical of the high praise accorded the supplementary classroom program distributed by the Better Light Better Sight Bureau. Last year, 30,000 teachers sent for this comprehensive program. It presents the intriguing subject of Light and Sight in a manner designed to heighten student interest and lighten teaching work. Moreover, the Bureau's aids are thoroughly up-to-date, in contrast to standard textbooks which are not normally able to keep abreast of rapid developments in this specialized field.

NEW KITS READY NOW

The Bureau's supplementary teaching program, "Working with Light", has been prepared after consultation with representatives of the N.E.A., the A.I.A.A., the A.V.A. and others prominent in industrial arts and vocational education. It is specifically formulated for high school and junior high school industrial arts classes, and includes a 116-page lighting handbook, 24 project leaflets and a reference folder for each of 24 students.

FREE FOR THE ASKING

A complete package of "Working with Light" materials will be sent *without cost or obligation* to shop teachers in areas served by a Better Light Better Sight Bureau utility sponsor. (We will check our sponsor list for your area.) For your free kit, use the readers' service card in this magazine . . . or simply send your own name, and your school's name and address, to: BETTER LIGHT BETTER SIGHT BUREAU, Dept. WWL-48. P.O. Box 1647, Grand Central Station, New York 17, N.Y. *(Offer not available to students nor to subscribers outside the U.S.A.)*

"Master's Degree Program for Industrial-Arts Majors" was discussed by Ralph O. Gallington, Southern Illinois University; Howard O. Reed, Iowa State Teachers College; and F. Theodore Paige, Ohio University. The concluding session on "Recent Research in Industrial Arts" was addressed by Ralph Wenrich, University of Michigan; G. H. Silvius, Wayne State University; and Marlowe E. Wegner, Moorhead, Minn., State College.

New members elected to the conference were Rogers Barton, Texas Education Agency; Rupert N. Evans, University of Illinois; Owen Harlan, Nebraska State Teachers College, Peru; H. L. Hilton, Northeastern State College, Tahlequah, Okla.; and Albert Squibb, State Supervisor for Industrial Arts, Ohio.

Eye Safety Club

FORMATION of the Junior Wise Owl Club of America, an organization to encourage eye safety among youth, has been announced by the National Society for the Prevention of Blindness.

Modeled on the successful senior Wise Owl Club of America, the junior group will enrol all youths, both boys and girls, who have saved their eyesight by wearing eye protection at the time of potentially blinding accidents.

Membership will be granted to any youngster, through high-school age, whose sight has been saved from injury or destruction through the use of spectacles with safety lenses or other recognized and approved eye protective devices such as goggles or face shields.

Information on the new club can be obtained from the National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N.Y. ★

Illinois Vocational Association, Chase-Park Plaza Hotel, St. Louis, Mo., Mar. 2-4.
California Industrial Education Association, Fresno, Mar. 17-18.
Ohio Industrial Arts Association, Neil House, Columbus, Mar. 23-25.
American Industrial Arts Association, Chase-Park Plaza Hotel, St. Louis, Mo., April 4-7.
Indiana Industrial Education Association, French Lick Sheraton Hotel, French Lick, April 6-8.
Michigan Industrial Education Society, Civic Center, Lansing, April 20-22.
Connecticut Industrial Arts Association, Central Connecticut State College, New Britain, May 5-6.

News ABOUT TRAINING
The Technician

Tech Association Incorporates

THE American Technical Educational Association now has an "Inc." after its name. The organization was recently incorporated by the Regents of the University of the State of New York as a nonprofit educational organization. William N. Fenninger is executive secretary of the Association, and its executive offices are at 22 Oakwood Place, Delmar, N. Y.

Trustees of the newly incorporated organization are: Carl Anderwald, associate in industrial education, New York State Education Department; H. Russell Beatty, president of Wentworth Institute, Boston, Mass.; Burr D. Coe, director of Middlesex County Vocational and Technical High Schools, New Brunswick, N. J.; G. Ross Henninger, president of Ohio College of Applied Science, Cincinnati; Richard W. Howes, assistant director, Division of Vocational Education, Connecticut State Department of Education; Edward H. Lang, principal of Central Technical High School, Syracuse, N. Y.; J. William Morosi, dean of Los Angeles Trade-Technical College, Calif.; Joseph T. Nerden, chief of the Bureau of Technical Institutes, Connecticut State Department of Education; William Pabst, principal of Brooklyn, N. Y., Technical High School; Laurence E. Spring, president of Erie County Technical Institute, Buffalo, N. Y.; Fred R. Thornton, consultant for technical education, Florida State Department of Education; Richmond A. Young, director of Vermont Agricultural and Technical Institute, Randolph Center; and Mr. Fenninger.

Current officers of the Association are: Laurence Spring, president; J. W. Morosi, vice-president; and Richard Howes, treasurer.

Future Need for Technicians

IT is expected that during the next 15 years employment of technicians will increase at least as fast as the employment of engineers and scientists, according to the Area Vocational Branch of the United States Office of Education.

By 1975, it is expected that the rate of employment of technicians will more than double.

The chief factors, according to

Bureau of Labor Statistics, are the increasing complexity of industrial and military technologies plus the vast increase in expenditures for scientific research and engineering research and development.

Programs in Progress

In Arizona.—Arizona State College, at Flagstaff, is now offering a two-year program for training electronics technicians.

In Mississippi.—As of October 1, 1960, approved Title VIII programs for training technicians are being offered at Itawamba Junior College, Meridian Junior College, Northwest Junior College, Pearl River Junior College, Perkinston Junior College, Delta Junior College, Jackson Central High School, and Pascagoula High School. Areas of instruction are electronics, communications technology, drafting and design technology, industrial electricity, metal-processing technology, industrial psychology, technical-report writing, civil technology, technical physics, technical mathematics, mechanical technology, and tool and die design.

In Kentucky. — At the Lafayette Area Vocational School, a 22-month long course in tool-design drafting is being offered to meet the needs of central Kentucky industry.

The program is designed to prepare students for positions as designers of jigs, fixtures, dies, and special tools. Related subjects include mathematics, physics, and strength of materials. Students are selected for the course on the basis of individual interest in the subject, and "apparent ability in drafting."

Enrolment in the new program is seven adults and 13 high-school students. Over-all enrolment at Lafayette is 70 adults and 215 high-school students in the day program, plus 125 students in the evening extension program.

In Missouri.—More than 200 students are enrolled in a data-processing course offered at the O'Fallon Technical High School Adult Division. Started in the fall of 1959, the course is offered cooperatively by the St. Louis Chapter of the National Machine Accountants and the St. Louis Board of Education. The course teaches punched-card and electronic data processing with elementary as well as complicated electronic machines.

In Illinois. — New technician programs under Title VIII were initiated for the 1960-61 school year at the following locations: East Moline, drafting and tool design; Harvey, mechanical design; Rockford, electronics, mechanical design, and welding; Waukegan, general engineering.

All told, 2700 students were enrolled in 169 technician classes in the state during the 1959-60 school year.

Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

On the Record

As Sam came through the door of my office it was obvious that he was a splendid example of the human race. He was tall, his shoulders were broad, and he appeared to have all the qualifications of an effective football player. However, these are not the criterions on which desirability as a teacher is evaluated. Sam had documentary evidence which indicated that he had graduated from a teachers' college, and he informed us that he had taught woodworking and metalworking for a number of years. On the basis of these facts, it seemed that he was just the sort of chap so many superintendents are looking for.

Sam had been referred to us by a counselor in a neighboring university on the supposition that we might be able to help him find a suitable appointment as a teacher. However, before our interview with him had proceeded very far, we began to suspect that his referral to us was prompted by a desire on the part of the counselor to unload his problem on someone else. Apparently he had concluded that Sam was an undesirable member of the teaching profession, so he was unwilling to assume the responsibility of recommending him for a job.

When Sam appeared for an interview, it was evident that he had neglected to mow the unattractive Beatnik appendage that decorated his lower jaw. He was without a coat, and the T-shirt he wore had been omitted from more than one weekly wash. A broad-minded person might have ignored these deficiencies but, when they were coupled with a critical attitude toward his former associates and his former teaching positions, it began to be clear why his teaching experience had been spread over a number of different school systems,

NOW...

SCHOOL SHOP LUMBER WITH GUARANTEED QUALITY

CUT YOUR WASTE FACTOR TO A MINIMUM!

GET MORE USABLE BOARD FEET IN YOUR SCHOOL SHOP LUMBER!

When you buy HARCO lumber, you get *guaranteed quality*—lumber that is guaranteed as to species, seasoning, texture and grade.

You get the kind of School Shop lumber that assures maximum usability and minimum waste.

Our hardwoods grow in the Great Smoky Region of the Appalachian Mountains — America's finest. We accumulate lumber for school shops through a continuing program of texture-selection. We know the quality you need, properly kiln-dry it, and store it for school shop orders.

All lumber is carefully packaged and shipped direct from mill to your school via truck transports.

Get HARCO *guaranteed quality!* Get *more* usable board feet in every order! . . . Let us quote on your requirements.

READY-TO-SHIP ITEMS

ASH	CHERRY	POPLAR	WHITE PINE
BALSA	CHESTNUT	RED CEDAR	WILLOW
BASSWOOD	LIMBA	RED OAK	BIRCH DOWELS
BEECH	MAHOGANY	WALNUT	DRAWING BOARDS
BIRCH	MAPLE	WHITE OAK	PLYWOODS

BALL BAT BILLETS TURNING SQUARES

SAVE MONEY ON OUR DELIVERED PRICES

If your school is in a state east of the Mississippi, or in Arkansas, Kansas, Louisiana, Missouri, Oklahoma or Texas—we can save you money! See our catalog 1960-S for delivered prices. Catalog sent FREE on request, postpaid.

HARDWOOD CORPORATION OF AMERICA

EDUCATIONAL LUMBER DIVISION
P. O. Drawer 1091, ASHEVILLE, N. C.

ALLIED BEST BUYS
for TAPE RECORDING and ELECTRONIC TRAINING

Supreme Value KNIGHT 2-Speed Dual-Track Tape Recorder

ONLY **$86.95** $5 down

Exceptional combination of sound fidelity and rugged dependability. Features: fingertip-selected speeds 3¾ and 7½ ips; 6-watt amplifier; separate tone and volume controls; built-in 5" woofer and 4" tweeter with electrical crossover; extra jack permits playback through an external speaker; recording level indicator; fast wind and rewind (with rewind lock-in); single-lever control for "Play-Idle-Record" functions; tape guide post for proper tape alignment. Compact—19 lb. carrying weight. Complete with mike, full 7" reel of premium recording tape and 7" take-up reel. U.S. made; unbeatable value.

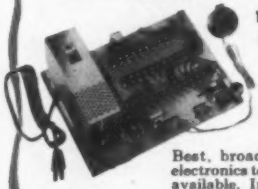
35 DU 710. *$5.00 Down.* Net..... **$86.95**

See Our Catalog for Additional Recorder Buys

LANGUAGE LABS at BIG SAVINGS

Let us show you a way to provide up-to-the-minute language training facilities at minimum cost. We can supply a lab for every budget. *Ask for Bulletin I-3069.*

***knight-kits*®**
Best for Training in Electronics



12-in-One Electronic Lab Kit only $14.95

Best, broad-coverage electronics teaching aid available. Includes 12 circuit projects, each demonstrating basic electronic applications. Components, once mounted, remain in place and last indefinitely; select any of 12 circuits by simply changing jumper wires. Includes tube, photocell, mike, hardware, solder, wire and detailed instructions.

83 Y 272. 12-in-1 Kit. Only..... **$14.95**

FREE 1961 *ALLIED* CATALOG

444-page buying guide to everything in electronics for your school: Knight-Kits for training; lab instruments; sound and recording equipment; books; tools; electronic parts. Write for Free copy.

ALLIED RADIO

ALLIED RADIO, Dept. 193-A1
100 N. Western Ave., Chicago 80, Ill.

Ship the following: ☐ 35 DU 710. ☐ 83 Y 272.

☐ **Send FREE 1961 Allied Catalog**

☐ Send Language Training Bulletin I-3069

*Name*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

and why he was presently seeking another appointment.

All of which raises the question, "What should one do under such circumstances?" When one attempts to answer this question, he must keep in mind that when he is asked to recommend a person for a position, he owes it to himself to protect his reputation. If he desires to maintain a good reputation in his profession, he cannot do less than tell the truth, or keep silent. When a superintendent asks for an opinion concerning an applicant for an appointment, he hopes to learn the facts. He is depending on a third party for his information, on the basis of which he proposes to select a teacher. If this information is not a true picture of the individual being considered, the fact is apt to become apparent after the candidate has been appointed. When it does, the reputation of the person who submitted the report is sure to suffer in the opinion of the superintendent.

We are not well enough acquainted with Sam to know whether or not he was a nice person or that he belonged to the same fraternity or to the same church. Moreover, it is likely that the prospective employer would want to know if Sam is cooperative, if he has initiative, and if he gets along well with people. If we find it necessary to express a negative attitude about any one of these or other similar characteristics, we owe it to ourselves to do so in any recommendations we make.

We must always keep in mind that each individual makes his own history in life and on his job. This history is indelible and, when someone has occasion to scrutinize it to find out what manner of man the person is, the appointing official cannot be blamed if he concludes that the record indicates that this particular applicant is not the man for the job to be filled. With Sam, the record was not so good.

The moral attached to all of this is that, as a person goes about the business of teaching, his attitudes and his behavior impress others who may one day be in a position to help him. When an opening appears which carries greater responsibility, and he wishes to be considered for the position, what these individuals have to say about him may affect the balance in his favor or against him. Take heed, fellows, what you do today may affect you tomorrow, for good or bad. ★

★strictly personal

Gordon O. Johnson is now teaching industrial education at Western Michigan University, Kalamazoo. He was supervisor of industrial education, Missouri State Department of Education.

Homer A. Lawrence, Jr., now teaching industrial arts at Memphis, Tenn. State University, was formerly an engineering-drawing teacher at Arlington Tex., State College.

Robert W. Cynar, Emanuel Gillers, Robin Kazer, and **Arthur Weener** have been appointed supervisors of industrial arts for the Board of Education, New York City. They are the first appointments in the proposed new industrial-arts department, which will consist of a director, two assistant directors, and eight supervisors.

Ralph V. Steeb, now consultant for industrial-arts education, State Department of Education, Tallahassee, Fla., was a member of the industrial-arts staff, University of Miami.

Gerald James, is now state director of vocational education. North Carolina, succeeding **J. Warren Smith,** retired.

Jack Nix, now director of the Vocational Education Division, State Department of Education, Ga., was supervisor of teacher certification and former superintendent of schools in Banks County. He succeeds **George I. Martin,** retired.

R. Vard Martin has retired as director of industrial education for the Dearborn, Mich., public schools.

Calvin J. Cotrell, now director of trade-technical teacher education, Ferris Institute, Big Rapids, Mich., taught vocational T & I teacher education at The Ohio State University, Columbus, while completing his doctorate there.

Wilbur R. Miller, now assistant professor of industrial education at Purdue University, Lafayette, Ind., was on the staff of the University of Missouri, Columbia.

Everett R. Glazener, now on the industrial-education faculty at Colorado State College, Greeley, was on the staff of Arkansas A & M College, College Heights.

Leon J. Alger, is now vocational-education research consultant, State Department of Public Instruction, Mich., succeeding **Philip Proud.**

John Snell, now Maine state director of vocational education, succeeding **Maurice Varney,** was state supervisor of agricultural education.

Leland Mentzer, industrial-arts teacher in Medford, Ore., schools for 40 years, has retired.

Lester Orcutt, industrial-arts teacher for 38 years, 36 of these years in Mt. Pleasant, Mich., schools, has retired.

Bernard Rappaport, Levittown, N.Y., and **John J. Grimes** are president and secretary-treasurer, respectively, of the Long Island Council of Technical Administrators.

Hugh Cary McGary, has been named assistant professor of industrial arts at the College of William and Mary, Norfolk, Va.

S. Wayne Taylor, newly elected president of

the International Graphic Arts Education Association, is director of the University of Houston Printing Plant and associate professor of journalism at the University.

G. Stewart Johnson has been appointed assistant professor of industrial engineering at Western Michigan University, Kalamazoo.

Charles Collins, is now head of the industrial-art department at West Virginia Institute of Technology, Montgomery, replacing **Charles Blosser,** who is studying at Michigan State University, East Lansing.

Philip G. Baird, now state supervisor of T & I education in Illinois, succeeding the late **James F. Meyerhofer.** Mr. Baird will serve the southern area of the state.

departments are interested in these displays and revise previous conceptions of what is done in shop courses.

Q. What teaching procedure is best with gifted students?

A. I doubt whether any particular procedure is most effective. Individual instruction is obviously essential. Probably the teacher's own enthusiasm and drive, good humor, and sympathetic encouragement, which are attitudes rather than procedures, have most influence with students. At the same time, we must not forget that there are gifted students who will not work up to their capacity unless pressure tactics are used. They are few, but they do exist.

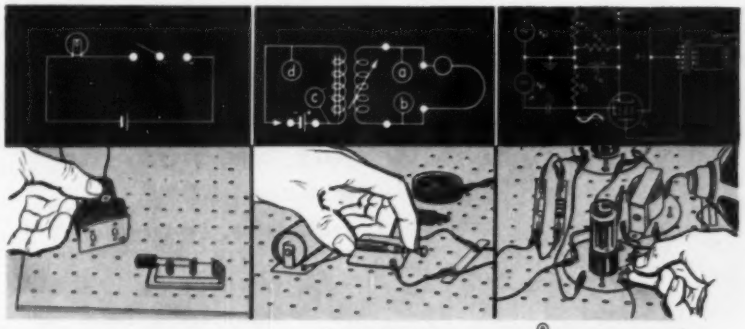
Perhaps my own experience some years ago, when I was new to the school and was in a position somewhat similar to some of these teachers who have asked these questions, will be of interest.

In one of the first classes I taught in the school, a ninth-year class, I encouraged several students to attempt projects which could not possibly be completed in the class time

Industrial Arts . . . *from page* 8

In the orientation discussion at the beginning of the course (11th year), we emphasize that hand and machine tools are used to work with materials in many of the professions to which they aspire. Many tools in science and industry are simply amplifications or combinations of the basic tools and machines of the industrial-arts shop or laboratory, based on the same principles and used in fundamentally the same manner. Also, the techniques of manipulation in surgery, working with radioactive materials which have to be located accurately in space, micro-manipulation, and amplification of delicacy of touch are only a few examples of the application of the principles of simple machines on which all use of tools and instruments is based. Every research laboratory has tools, machines, and materials for making new instruments and apparatus, or for adjusting and changing what already exists. Expert craftsmen are available, it is true, but most scientists nowadays have learned how to use tools and machines in high school. Any engineer, physicist, or chemist will readily admit the need for a good workshop and the ability to use tools. For the stage, television, and movies, for the rehabilitation of those who have lost the use of limbs, in dentistry and surgery, in industrial design and manufacture, in structures large and small, tools, machines, and materials are essential.

We display completed projects in well lighted, glass-fronted cabinets at strategic locations in the school and, on request, loan displays to local community centers and public libraries. For outside displays, we insist that the projects be covered by insurance against breakage and theft. Not only students but teachers in other de-



CHOOSE THE *EREC*TRONIC® SYSTEM
to simplify your teaching methods

Whether your program involves teaching electricity or electronics as part of a General Shop Program, an Industrial Arts Course, or a comprehensive course, there is an ErecTronic System exactly suited to your requirements for the Elementary, High School, or Vocational School level.

Versatile ErecTronic System Kits are complete teaching and learning aids of unparalleled flexibility and utility. Everything essential to complete instruction, demonstration, and learning is furnished — for short introductory courses or full two-year programs.

No time is wasted by teacher or student, because no special tools or soldering are required. Exclusive Jiffy Clip* connectors slip easily over posts. These connectors are so reliable that they are used by professional engineers for circuit development. Components are mounted on bases with plug-in pins, and fit into precision-drilled workboards.

Manuals for use with ErecTronic Systems contain specifically designed experiments to facilitate students' understanding of principles through the process of *doing* and *observing* as opposed to reading and memorizing. Class room theory can be easily coordinated with laboratory exercises.
*Patented

ERECTRONIC SYSTEM KITS ARE AVAILABLE FOR MANY COURSES INCLUDING:

Exploring Electricity L-200W	$39.95	Purchase Guide No. 1350
Exploring Electronics T-175W	$39.95	Purchase Guide No. 4335
Basic Radio Circuits 2-RF	$59.50	Purchase Guide No. 3510
Basic Electronics BE5-T	$210.00	

Write for ErecTronic Technical Data

SCIENCE ELECTRONICS, IN[illegible].
195 MASSACHUSETTS AVENUE, CAMBRIDGE 39, [illegible]SS.

available. I am inclined to experiment, and I wanted to find out what these students were like and what they could do. Two projects, an electronic computer and a combination hi-fi radio and record player, will long be remembered by that class. The computer was an impressive sight after several weeks of work: a mass of lights and switches. The radio was made almost entirely from parts and materials picked up from junk heaps outside nearby apartment houses. There was no end to the problems. Work went on whenever I was in the shop (I taught in two shops and a drafting room) and the builders of these projects had study periods. Several other boys became interested, did research in the library, and were full of suggestions, some of them helpful. For a while, the only station the radio was able to pick up was the one at Fordham University, about half a mile away. The computer came up with some weird results. Both projects were tested and adjusted and tested and adjusted for two weeks until finally they worked properly. Outer cases were made and finished and, at my suggestion, they were entered in the Bronx Borough Science Fair. Both won prizes.

Every member of the class made a science project at the time this was going on, and many of them will remember how, ready to give up because their projects would not work, they were urged to keep on trying, checking joints and connections, reducing friction, balancing carefully, and so on, until success was finally achieved. One girl burst into a song of triumph when her project, which measured blood pressure and indicated pulse rate, actually worked, and her friends joined in so heartily that stern measures had to be used to restore quiet.

Q. Have you any instruction sheets on how to build projects?

A. We have no instruction sheets. We use some mimeographed material on safety in the shops, some word lists, and lists of what is required of the student. The June 1958 article that appeared in this magazine explains this. One of our teachers has been working with the Industrial Arts Bureau of the New York State Education Department in developing unusual projects, problem activities, and experimental devices for integrating science, mathematics, and industrial arts. Similar activities are probably going on in other centers.

Q. What do you mean by the term "science project"?

A. A science project should satisfy the following criterions:

1. It will illustrate one or more principles of science. A working model of a machine, or similar teaching aid, would be an example of this. We might call this external science.

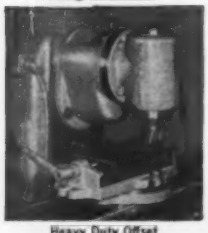
2. Its design and construction will involve understanding and use of several scientific principles, internally, as in an electronic device or a telescope.

3. It may be an essential piece of equipment which must be constructed to perform a scientific experiment or investigation.

4. It should not be so simple as not to provide any challenge in its design and construction.

(*Note*: The proper use of tools and materials involves many principles of science. These principles should be discussed during demonstrations. Such applications of science and applied mechanics as are involved in the design and proper use of hand and machine tools, fasteners, finishes, and

Heavy Duty Vertical Milling Attachment


Heavy Duty Offset Vertical Milling Attachment

Universal Milling Attachment

Toolmakers Overarm

Heavy duty attachments increase versatility of dependable, low-cost

GREAVES MILLS

"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS. Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.

GREAVES MACHINE TOOL CO.
2300 Eastern Avenue, Cincinnati 2, Ohio

Send Comparison Chart. I will make my own comparison of GREAVES MILLS with other makes.
Send information on Attachments and Accessories for GREAVES MILLS.

NAME _____ TITLE _____
FIRM _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

materials can often be elicited from students.)

Q. In your elective courses, advanced science techniques laboratory, and advanced mechanical drawing, do you have any guidance problems?

A. We are all familiar with the attitude toward industrial arts of many academic teachers who are guidance counselors. During the long period, now at an end for a while, when educators in this country were concerned chiefly with the slow learner (and assumed that the gifted student could take care of himself), industrial arts demonstrated its value in helping to educate the nonacademic pupil. As a result, industrial arts became associated in the minds of guidance counselors and school administrators with the kind of pupil who was not going to college. This attitude dies hard.

In our elective courses, we don't get enough of those students who have real ability in shopwork and drafting. They are guided elsewhere, in accordance with the judgment and opinions of their counselors, into more advanced mathematics and science courses.

My concept of guidance calls for providing information to the student and his parents, so that they can make up their own minds. Directed opinions, influenced by factors not connected with the student's best interests, should be kept to an absolute minimum.

Toward the end of the courses in science techniques laboratory 1 and basic mechanical drawing, we discuss the opportunities available for qualified students in our elective courses. We provide mimeographed material for those interested. This material includes a quotation from page 160 of the *Harvard Report of 1945*, as follows:

"The lack of shop training is at present a most serious deterrent to entry into all types of technological work and to college and postgraduate training in science, medicine, and engineering."

We emphasize that, due to the limited time, they have learned only the elements of shopwork, and point out, with illustrations, how valuable the knowledge and experience to be gained in the advanced science techniques laboratory course would be to imaginative future physicists, surgeons, and engineers.

There is no lack of applicants for the course in advanced mechanical drawing. We try to limit the class to those who have shown superior ability in basic mechanical drawing. High intelligence does not guarantee possession of the necessary manual dexterity, the feeling for mathematical accuracy, and the ability to visualize in three-dimensional space. Often a student who is outstanding in mathematics begins by seeing a drawing only as a jumble of lines and needs more help and encouragement than others.

I hope that these few typical questions and answers will be helpful. The answers, of course, are in terms of our particular experience. We are a large, special school with selected students who have superior intelligence and interest in science and mathematics, but are completely unselected for ability and interest in industrial arts. We would be interested, and perhaps encouraged, to learn of the experiences of others who are building similar programs of study in industrial arts for gifted students. ★

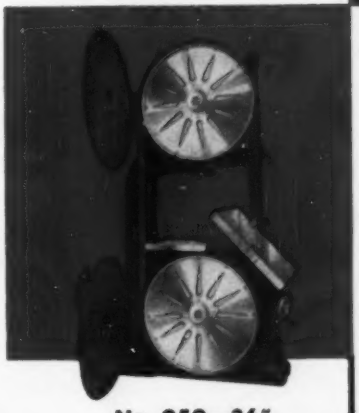
for utmost accuracy
and increased production—
low-cost, easy to operate

FAY·EGAN
SAWS

No. 511-B TILTING ARBOR SAW

Mitering—Trimming—Dadoing—Gaining and Allied Operations

- 16" Saw Rips 4" Stock
- 18" Saw Rips 5" Stock
- Rugged Steel Frame
- Built-in Dust Chute
- Heavy Duty 5 HP Direct-Mounted Motor



No. 950—36"
High Speed BAND SAW

- Smoother cuts assured
- Less follow-up needed
- Full Safety-Guarded
- Carter Demountable Wheels

METAL CUTTING MODELS AVAILABLE!

TABLES AVAILABLE!
Extended tables for either right or left hand . . . to suit your production set-up.

Write TODAY for complete specifications

The J. A. FAY & EGAN CO.
World's Oldest Manufacturer of Woodworking Machines
2004 Eastern Avenue
Cincinnati 2, Ohio

Custom-Tailored for **Teachers!**

CROW'S REVOLUTIONARY NEW PROGRAMS FOR TEACHING ELECTRICITY AND ELECTRONICS

Not a mere set of teaching aids . . . but a completely coordinated teaching system . . . by educators for educators!

No Advanced Technical Background Necessary

All you do is send for this FREE booklet, "Programs for Teaching Electricity–Electronics".

Select the program suitable for your class and write us. Each unit includes instruction manuals, student experiment equipment, instructor demonstration aids, lesson sheets, power supplies, and progress checks.

Even if electricity and electronics are not your specialty, you'll find them easy to teach, easy for your classes to understand.

AVAILABLE NOW . . . SO WRITE TODAY!

CROW

UNIVERSAL SCIENTIFIC CO., INC.
BOX 111, VINCENNES, INDIANA

instructional Resources

Books:

Handy Man's Concrete and Masonry Handbook. DeCristoforo. New York: Arco Publishing Co., 1960. Pp. 144. $2.50.

This handbook is intended to assist the handyman in solving some of the problems he encounters when he decides to do a job involving bricklaying or the use of concrete.

The material in the book includes a list of the basic fundamentals for mixing concrete; it provides expert tips on bricklaying, and it explains in detail how to build walks and driveways. In addition, complete plans are provided for the construction of a concrete-block garage and a family swimming pool.

Over 300 illustrations and drawings show how to build terraces, retaining walls, and drywells. Even the most inexperienced do-it-yourself enthusiast should be able to follow the directions given.

Metal Spinning Techniques and Projects. Johnson. Milwaukee: Bruce Publishing Co., 1960. Pp. 130. $3.50.

The purpose of this book is to provide beginners in the art of metal spinning with a guide to the use of the tools, equipment, methods, and materials used by craftsmen in this field. At the same time it provides suggestions which may be appreciated by the expert.

Each chapter deals with one aspect of the craft. Among the topics covered are the history of metal spinning, safety, planning and designing projects, tools used, metals suitable for spinning, soldering, and modern techniques in general use.

Instruction sheets for a large number of interesting projects are included, which should add to its value as a text in classes where metal spinning is a unit in a course in general metal.

Harold V. Johnson is instructor in metalworking in the Canton, Ill., Senior-High School.

Theory and Practice of Arc Welding. (Second Edition.) Sacks. Princeton, N. J.: D. Van Nostrand Co., Inc., 1960. Pp. xiv + 478.

This textbook has been planned for use in schools where one of the objectives is to offer a wide experience in arc welding.

Part I contains a chapter on arc welding equipment. It also covers the fundamental joints and welds and their characteristics. Testing and inspection are dealt with as well as some material on the flame-cutting of metals.

Part II is devoted to the problems of teaching the welding craft. Suggestions are made for various tasks the teacher has to perform when conducting a class. A long list of jobs is provided, and these are arranged in order from the simplest to the more difficult.

A large section is devoted to more advanced work, including pipe-welding, joint design, and an outline of a practical course in inert-gas, shielded, tungsten, arc welding. In addition, there has been included a list of the welding codes, and an outline of the rules, regulations, and specifications pertaining to arc welding.

Raymond J. Sacks is supervisor of T & I education in St. Louis, Mo. He is also director of the Pipefitters Training School in the same city.

Applied Teaching Techniques. Weaver and Cenci. New York: Pitman Publishing Corp., 1960. Pp. vi + 258.

This book is designed for use in teacher-training classes, but it contains much that should be of interest to teachers who are presently active in industrial education.

It deals with many specific problems with which shop teachers are faced. The book covers discussions of occupational analysis, individual differences, methods of presenting a lesson, and testing – to mention only a few. In these discussions, many worthwhile suggestions are made that should prove helpful to the experienced teacher as well as to the beginner. Teachers at all levels of industrial education will profit from having a copy on their reference shelves.

Up until his retirement, Gilbert G. Weaver was director of industrial teacher training, New York State Department of Education. Louis Cenci is an industrial teacher educator in the same department.

Photo-Offset Fundamentals. Cogoli. Bloomington, Ill.: McKnight & McKnight Publishing Company, 1960. Pp. xiii+209. $4.80.

This book is a basic manual which has been designed to give a working knowledge of photo-offset lithography. It is a practical volume on the subject, with the material presented in a selfteaching manner.

It is illustrated with over 300 photographs or line drawings which serve as excellent visual aids, showing exactly the use of equipment and procedures to be followed.

Both teachers and students in the graphic-arts field will find the book to be most helpful when this type of printing is being considered in class.

John E. Cogoli is graphic-arts teacher in the Hartford, Conn., Public High School.

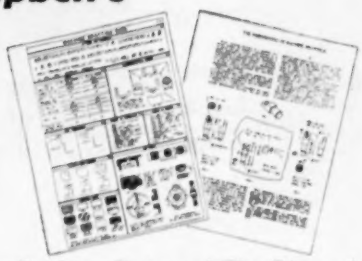
Pamphlets:

Hobart Vest Pocket Guide To Better Welds is a revised edition of **How to Get Better Welds,** published by the Hobart Brothers Company. There are 80 pages of welding information. Also available is "Arc Welding

Your drafting students need these low-cost

Drafting Time Savers

Campbell's



Machine Drafting Data and The Dimensioning of Machine Drawings

IDEAL FOR STUDENTS! Easily inserted in loose-leaf notebooks. All pertinent information included.

Send in the coupon below!

Prakken Publications
330 Thompson Street
Ann Arbor, Michigan

Please send: _____ copies of "Machine Drafting Data" chart
_____ copies of "The Dimensioning of Machine Drawings" booklet

Price list (same for each item): 1-5 copies, $1 each; 6-10 copies, $.85 each; 11-50 copies, $.75 each; 51 or more copies, $.60 each.

Enclosed is $_____ Please bill _____

Name _____

Address _____

1/61 _____ Purchase Order No. _____

Something New from Kalamazoo

KALAMAZOO

Model 8CW-B1 Automatic Cut-off Machine

$1485.00 COMPLETE

If cutting costs and increasing production are most important to you, then the 8CW-B1 is the saw for you. Its low cost, completely automatic operation has been job tested and approved for accuracy and efficiency using low cost carbon steel blades. Write today for prices and literature or contact your local authorized Kalamazoo distributor.

MACHINE TOOL DIVISION KALAMAZOO TANK and SILO COMPANY

459 HARRISON ST. KALAMAZOO, MICH.

YOUR FURNITURE PROJECTS DESERVE . . .

FINEST HARDWOOD LEGS

six different sizes...all low cost!

SIZE	SET OF FOUR
6"	$2.00
9"	2.35
12"	2.70
16"	3.00
22"	3.50
28"	3.80

Ferrules . . . 10¢ ea. Two way plates (vertical or 10° cant) . . . 10¢ ea.

McPHEE-THOITS MANUFACTURING CO.
739 Cottage Grove, S.E. Grand Rapids 7, Mich.

BILLINGS®

Since 1869 Tools and Forgings of Quality

WRENCHES

FREE BOOKLET GLADLY SENT

SHOP TOOLS

THE BILLINGS & SPENCER CO.
HARTFORD, CONNECTICUT.

Teachers Demanded These Books

Understanding Electricity and Electronics, Buban and Schmitt, February, 1961.

At last a truly introductory textbook in electricity and electronics. In clear, concise, and well-illustrated manner, it presents the basic concepts of electrical and electronic theory, the application of these principles in familiar consumer products, and the tools, materials, and processes used in making them.

Machine Tool Metalworking: Principles and Practice, Feirer and Tatro. February, 1961.

The first really new machine shop book in the last forty years. The book emphasizes the "why" as well as the "how". It thoroughly describes and explains the correct setups and operations for the five basic machining methods: drilling, turning, shaping, milling, and grinding.

School Department

McGraw-Hill Book Company, Inc.

330 West 42nd Street New York 36, N. Y.

Get this new binder for *School Shop*

●

Keep Your Back Issues Handy and Clean

●

√ **Holds 10 issues of School Shop.**

√ **Easy to add new copies.**

√ **Soil-resistant blue imitation leather.**

√ **Copies lie flat and open for easy reference.**

√ **School Shop embossed in gold on front and backbone.**

●

Order yours today!

$2.50

plus shipping

Prakken Publications
330 Thompson St.
Ann Arbor, Michigan

Please send me ..... (No.) School Shop binders.

☐ Money enclosed. ☐ Please bill.

Name _____

Address _____

_____ 260

Electrode Selection," a 16mm, color film produced by Hobart Brothers. The Vest Pocket Guide and use of the film are free. Write to Hobart Brothers Company, Troy, Ohio.

Facts You Should Know is a series of bulletins by the Public Information Committee of the American Vocational Association, H. M. Hamlin, chairman.

Three recent titles in the series are **New Developments and Their Impacts on Trade and Industrial and Practical Arts Education, Distributive Education,** and **Occupational Distribution, A Factor in Educational Planning.** These bulletins are intended for use with laymen, school-board members, and general educators. For copies, write the AVA, 1010 Vermont Ave., N. W., Washington 5, D. C.

Audio Visuals:

Old As the Hills is a 16mm, sound-color film that tells the story of abrasives. Produced by the Norton Company, the film describes the evolution of abrasive materials and their use in man's works. Although produced with a general audience in mind, the the film also will be of interest to those with a technical interest in abrasives and grinding techniques. For information on free booking of this film, write to Norton Company, Worcester 6, Mass.

Building Weather is a 16mm, sound filmstrip covering the development of inside design conditions along with a review of the problems involved in insulating air-conditioning systems. Produced by the Armstrong Cork Company, the film shows the latest results of a continuing study of the problems of insulating air-conditioning systems. The film is available by writing Department BW, Armstrong Cork Company, Lancaster, Pa.

Siding Sense is a 16mm, color-sound film with a basic theme concerned with the use of wood siding in modern design and architecture. The film runs for 14 minutes. It is produced by the Western Pine Association and joins a library that also contains "The Bounty of the Forest" and "Operation Attic." The three films are available on free-loan basis. Write Western Pine Association, 510 Yeon Building, Portland 4, Ore. ★

"Guess what I made in shop this year, Mom."

NEW, easy way to clean WOOD

●

Instantly removes
pencil marks
fingerprints
heel marks
grease, etc.

Cleanwoode

should be used especially before clear finishing or staining. You simply moisten a rag with this unique solvent and wipe the surface. Does not raise grain and evaporates quickly. Far better than sandpaper, which tends to force dirt and grease more deeply into the wood. At paint and hardware stores.

Illustrated Refinishing Manual sent postpaid on receipt of 25¢

Wilson-Imperial Company, 132 Chestnut St., Newark, N. J.

New!

x-acto® PENKnife

The world-famous X-acto Knife in a brand new 'carry-about' case. Has the looks and feel of a sleek pen . . . with every wonderful feature of an X-acto surgically-sharp knife. Unique SEE-THRU CAP reveals the blade.

$1.00 with surgically-sharp blade

Actual Size

Shown Open, ready for action.

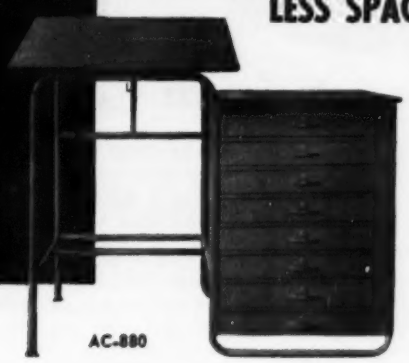
Holds 3 blade styles . . . instantly inter-changeable. Case is highly polished gold-finish metal. SEE-THRU CAP is crystal-clear heavy-gauge plastic.

See your dealer today!

X-ACTO, INC.
48-93 Van Dam St.
Long Island City 1, N.Y.

HARCO

MORE STUDENTS---
LESS SPACE



AC-880

"Board and T-Square" stored in its individually locked 20½ x 26½ x 2¾" drawers. Accommodates more students with greater convenience. Extra boards rest on rails with ample space below for instruments in each drawer. "Quick lock handle adjustment" offers fast self-locking positioning of tops. Also available as a dual model.

C1624

HARCO Over 25 styles and sizes of chairs and stools available. Equipped with the famous "Lift-Lok" mechanism.

Write, Wire or Call for FREE 30 day trial and details.

GARRETT TUBULAR PRODUCTS, INC.
P.O. BOX 237 DEPT. SS GARRETT, INDIANA

IRWIN School Shop Special

Stock No. D-13
SIZES ¼ to 1"

Set of 13 Irwin Wood Bits and colorful Metal Storage Rack

This new Irwin bit set and rack helps keep tools in place, teaches neatness in your shop. Assignments will be completed quicker, too. Irwin solid center bits cut clean, fast, accurate. Each Irwin bit hardened full length to stay sharp longer. Durable steel rack screws on wall or bench. Patented spring-steel clips hold bits firmly in place. Size markings on rack for easy selection. Quantity limited—so see your independent hardware dealer soon.

FREE BOOKLET: Tells How to Select, Use, Care for Auger Bits. A useful training help for School Shops. Send name and address to Irwin, Dept. 11-S, Wilmington, Ohio.

IRWIN Wilmington, Ohio — the original solid center auger bit • screw drivers screw driver bits

every bit as good as the name

Are You Remodeling Your Shop?

Get Suggestions from

Modern School Shop Planning

(Revised Edition)

Full of ideas you may adapt to your needs. Plenty of pictures, too, for suggestions. Hints on layouts.

• 184 Pages • $3.85

PRAKKEN PUBLICATIONS
330 Thompson St. Ann Arbor, Mich.

FAMOWOOD ... the AMAZING ...

ALL-PURPOSE PLASTIC for wood finishes!

APPLIES LIKE PUTTY . . . STICKS LIKE GLUE!

FAMOWOOD is the answer . . . where wood finishes are important. Simple to use . . . efficient, lasting, time-saving, when filling wood cracks, gouges, nail and screw holes or correcting defects. CAN BE USED UNDER FIBERGLASS. Dries quickly, doesn't shrink. Stays put under adverse conditions. FAMOWOOD sands easily, does not gum up sander. Takes spirit dye stains freely. Waterproof and weatherproof when properly applied. Ready to use—"right out of the can." 15 matching colors, with amazing matchless wood finishes.

USED BY FURNITURE MFGS. • SASH AND DOOR MFGS. • CABINET MAKERS • CONTRACTORS • BOAT BUILDERS • PAINTERS • AIRCRAFT PLANTS • PATTERN SHOPS • HOME BUILDERS • ALL WOOD PRODUCTS

FAMOWOOD descriptive literature & price list on request. Distributor & Dealer inquiries invited, write Dept. SS-5

BEVERLY MANUFACTURING COMPANY 9116 SOUTH MAIN STREET LOS ANGELES 3, CALIF.

Manufacturers of...FAMOWOOD • FAMOGLAZE • FAMOSOLVENT

FOR THE SCHOOL SHOP

BENCHES	MACHINE TOOLS
CERAMIC SUPPLIES	METALCRAFT TOOLS
DRAWING & DRAFTING SUPPLIES	METALWORKING TOOLS
ELECTRICAL SUPPLIES	METALS
FINISHING MATERIALS	PORTABLE ELECTRIC TOOLS
HAND TOOLS	PRECISION TOOLS
HARDWARE	SHEET METAL EQUIPMENT
LEATHERWORKING SUPPLIES	WELDING EQUIPMENT

PATTERSON PB BROTHERS
15 PARK ROW NEW YORK, N.Y.
YOUR MOST DEPENDABLE SOURCE SINCE 1848

PEXTO

COMBINATION ROTARY MACHINE

With a variety of interchangeable rolls, this combination machine handles turning, burring and wiring . . . also elbow edging and flanging. Will feed and gage for either direction. Like all Pexto products they're right for the experts . . . best for the learners. Write today.

Complete line of machines and tools for Sheet Metal work.

THE PEXTO STOW & WILCOX COMPANY SINCE 1185 SOUTHINGTON, CONNECTICUT U.S.A.

CMC QUALITY CRAFTMETAL

enhances students' chances of outstanding achievement!

ETCHING

STIPPLING

HAMMERING

NEWS FLASH!
COLORAMIC ALUMACRAFTING IS HERE!
Now, you can offer your students aluminum circles in five gorgeous colors.
Send for FREE literature today!

Students' metalcraft projects get the benefit of the best materials obtainable when you supply your classes with our Super-Brite MIRROR-Finish Aluminum and other specially-prepared craft metals. Available in circles (flat or preformed), in rectangles (flat or preformed), in bracelet blanks and other shapes... for etching, hammering, stippling and other treatments... in making trays, coasters, bracelets, medallions, pendants, plaques and many other beautiful and useful items... *Craft Metals Corporation craft metals are tops!*

SAFE-T-ETCH
NON-ACID ETCHING AGENT
a boon to the craft instructor

Safe-T-Etch, our new non-acid etching compound, is growing rapidly in popularity—especially in group work—because it does away with the old hazards and objectionable features of etching with acid. Students are extremely enthusiastic with this safer ...faster...easier way of etching aluminum.

MAIL COUPON TODAY FOR
FREE BOOKLET
AND METAL PRICE LIST

CRAFT METALS CORPORATION
(Formerly Metal Goods Corporation)

CRAFT METALS CORPORATION
1610 Hampton Avenue
St. Louis 10, Mo. SJ

(Please print or type)

Name_____

Address_____

City_____ Zone____ State_____

School_____

news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

Witherby Introduces New Adjustable Wrench Line

Witherby Products Div., John H. Graham, & Co., Inc., has announced a new line of thin-pattern, adjustable wrenches. The wrenches are of fully drop forged, chrome molybdenum steel with mirror polished heads and triple chrome plate overall.

Size range is 6", 8", 10", and 12". The wrenches are fully guaranteed.

For additional information write to the firm at 105 Duane St., New York 8, N. Y., mentioning SCHOOL SHOP; or *circle no. J-1 on the business-reply card.*

New Select-O-Matic Drill Press Introduced by Powermatic

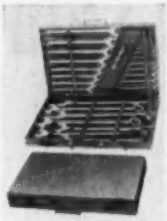
The Powermatic Machine Co., has announced development of a new drill press, the Select-O-Matic 20" drill press, that provides infinitely variable speeds from 120 to 1750 rpm.

A two-speed motor, with a variable-speed drive, makes it possible to perform both low-speed and high-speed drilling operations, reaming, spot-facing, tapping, and polishing, on a single drill press.

For more information write to the firm at McMinnville, Tenn., mentioning SCHOOL SHOP; or *circle no. J-2 on the business-reply card.*

Heavy-Duty Wrench Set Marketed by Proto

The Proto Tool Co. is now marketing a new, heavy-duty, combination-wrench set that is designed especially for the largest machinery and equipment.



Each of the 26 wrenches is locked firmly in place in the steel tool box that is also designed for rugged service.

Size range is from ¼" to 2", the wrench heads are slimmed to allow maximum work clearance but to retain maximum strength, and each wrench is forged of alloy steel with heavy chrome plate to resist weather damage.

For additional information write to the firm at 2209 Santa Fe Ave., Los Angeles 54, Calif., mentioning SCHOOL SHOP; or *circle no. J-3 on the business-reply card.*

"Pop" Rivet Kit Introduced by United Shoe Machinery Corp.

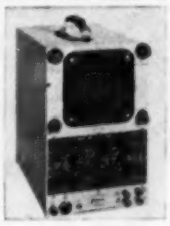
A complete rivet kit, consisting of a sturdy container with six individual polyethelene boxes, each containing 40 rivets in ⅛" diameters in steel, aluminum, monel, and combinations of all three, and a hand tool for setting the rivets in metal or plastic panels or sections, is now on the market.

Produced by the "Pop" Rivet Div., United Shoe Machinery Corp., the rivets are high-strength, precision-made, hollow rivets assembled on a solid mandrel, the company states. They are especially useful for blind fastening and are used for fastening sheet-metal and plastic components, as in the construction and repair of electronic products.

For additional information about this product and its use, write to the firm at 755 Boylston St., Boston 16, Mass., mentioning SCHOOL SHOP; or *circle no. J-4 on the business-reply card.*

New Laboratory Oscilloscope by Jackson Instrument Co.

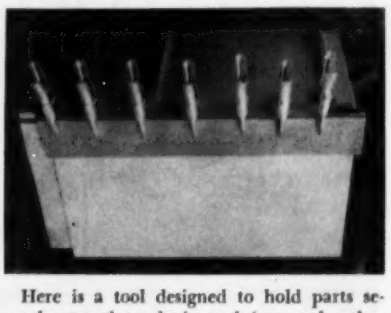
A new, compact Model 600 laboratory oscilloscope featuring a choice of wide-band or high-sensitivity operation is being introduced by the Jackson Electrical Instrument Co. The instrument is designed for industrial, scientific applications as well as radio, TV, and hi-fi servicing.



Among many improvements, the Model 600 has a regulated power supply for stable operation and a sweep frequency pulse on the panel terminal for transformer-ringing testing.

For more information write to the company at 124 McDonough St., Dayton, Ohio, mentioning SCHOOL SHOP; or *circle no. J-5 on the business-reply card.*

New Hand Spring Clamp by Arvids Iraids



Here is a tool designed to hold parts securely together during gluing and other assembly operations.

Recently patented by Arvids Iraids, the multi-clamp is spring-loaded to apply a pressure of 14 lbs. to assembled pieces. Movable

Enamel powders
Spraying equipment
Hotpack kilns
Enameled tiles
Jewelry kits
Metal shapes
Tools & accessories
Liquid enamels
Firing tools

OF CRAFT SUPPLIES

A complete line of supplies for enameling, ceramics, and other crafts. Order from one source for fast shipment and low price.

Over 200 enamel colors listed, more than 50 jewelry items, an outstanding selection of copper trays, bowls, and free form pieces.

SEND FOR YOUR FREE COPY NOW!

Thomas C. Thompson Co., Dept. SS
1539 Deerfield Road — Highland Park, Ill.

Please send your free catalog of enameling and craft supplies.

Name_____

Address_____

City_____ Zone_____ State_____

The **Parker** *Line Coping Saws*

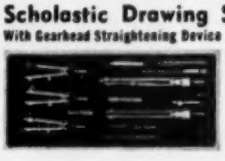
World's Largest Manufacturer of Coping Saws

Parker Manufacturing Co.
WORCESTER 1, MASS.

Ceramics-Mosaic Copper Enameling

Your complete source of materials & equipment. Fully illustrated. New
#6 INSTRUCTIVE CATALOG
FREE if requested on school letterhead (others 50c)
TEPPING STUDIO SUPPLY CO.
professional staff Dept. 68
3517 Riverside Dr. Dayton 5, Ohio

Scholastic Drawing Set No. 223
With Gearhead Straightening Device **NET: $3.80**



Write For Free Catalog
CENTRAL INSTRUMENT COMPANY
Dept. "A"
507 Fifth Avenue
New York 17, N. Y.

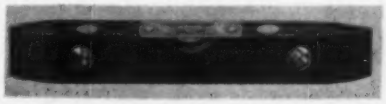
Send in your
Shop Teachers Service coupons
Today!

jaws are serrated to grip hard materials firmly, and rubber guards are supplied as jaw guards to protect softer materials during assembly.

According to information received from the company, the clamp permits easy one-hand operation, thus freeing the operator's other hand for careful positioning of the parts. The movable jaws automatically pivot to just the right angle or contours of the surfaces being held.

For more information write to the firm at 5930 Argus Rd., Cincinnati 24, Ohio, mentioning SCHOOL SHOP; or *circle no. J-6 on the business-reply card.*

Columbian Restyles Levels



The Columbian Vise and Mfg. Co. has announced complete restyling of its hardwood torpedo model levels.

Levels No. 209 and No. 309 now feature a new contour shape, streamline design with slim end points. The levels are made of natural finish hardwood with aluminum top plates. They are ¾" wide (at widest point), 1-¼" high, and 9" long. No. 209 has one plumb and one level. No. 309 has one plumb, one level, and a 45° vial. All vials are of the metallic-sealed type. These assure unusual accuracy, are shock resistant, and eliminate tip breakage, according to the company.

The company also announces two new aluminum levels with 24" rules along the top edge. The levels have full-size, die-cast frames and are made in both four-vial and six-vial types. The four-vial has two plumbs and two levels. The six-vial has four plumbs and two levels. Each is 1" wide, 2⅛" high, 24" long, and weighs 1½ lbs.

For more information about these items write to the company at 9023 Bessemer Ave., Cleveland 4, Ohio, mentioning SCHOOL SHOP; or *circle no. J-7 on the business-reply card.*

DeWalt Redesigns "1030" Radial-Arm Machine

DeWalt, Inc., reports refinements in the design of its "1030" model radial-arm machine. A new safety guard, that directs sawdust away from the operator, along with redesign of the radial arm and a new color—

Famous Harco "LIFT-LOK" Chairs and Stools

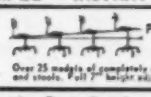
HARCO of GARRETT

Over 25 styles and sizes of chairs and stools available. Equipped with the famous "Lift-Lok" mechanism.

MATCHING CHAIRS AND STOOLS FOR ALL HARCO EQUIPMENT

The all NEW exclusive "Lift-Lok" adjustment automatically adjusts the seat for persons of all heights. From its lowest position to the desired height simply lift up seat and seat will automatically lock.

SIMPLE – INSTANT – POSITIVE


"LIFT-LOK" Posture Chairs And Stools By
Over 25 models of completely adjustable chairs and stools. Full 7" height adjustment.

Write for Free Catalog and Price List
FULL 12 YEAR GUARANTEE ON ALL HARCO CHAIRS AND STOOLS

GARRETT TUBULAR PRODUCTS, INC.
P.O. BOX 237 DEPT. SS GARRETT, INDIANA

PLAY IT SAFE...with the GS No. 657 GOGGLE

Type 657—Clear Type 657-G—Green

FOR SHOP AND LABORATORY
FEATHERWEIGHT PROTECTION

Specially designed and priced. Fits all faces, men, women, boys and girls alike. Lenses are impact resistant and afford adequate safety protection for light grinding, spot welding and other semi-hazardous operations. Attractive styling and special lightweight construction make this the goggle that everyone wants to wear. May be worn comfortably over prescription glasses.

Excellent for Chemical Labs and Indust. Arts

TYPES 657 & 657-G
1 doz. to 11 doz. $6.00 per dozen
12 doz. to 35 doz. $5.40 per dozen
36 doz. and over $4.80 per dozen
Sold only in dozen lots. Minimum order 1 dozen.

OPEN ACCOUNTS INVITED
Other styles available — Send for free catalog.

GENERAL SCIENTIFIC EQUIPMENT CO.
LIMEKILN PIKE and WILLIAMS AVE.
Philadelphia 50, Pa. HAncock 4-1550

FREE to Instructors

1961 Edition of Constantine's
WOODWORKING CATALOG & MANUAL

Since 1812 — World's Largest Source of Finest Rare Woods, Wood Finishing Materials and Tools.

EXTRA SPECIAL DISCOUNTS TO SCHOOLS AND INSTITUTIONS

Everything students need to work with wood—at *extra special discounts!* All-new Catalog is FREE to instructors! See world's largest selection — most complete source — of woodworking materials. Hard-to-get items for furniture, cabinet making, antique restoring, industrial arts. Rare domestic and imported woods, 120 kinds of veneers, plywoods, inlays, bandings, carving blocks, turning squares, clamps. Hard-to-find hardware, table legs, lamp parts, inlaid-wood-picture kits, mouldings, patterns, newest hand and power tools. Wood finishing and upholstery supplies, instruction books. Plus Identification Chart of over 60 rare woods in full color. Catalog & Manual FREE to instructors (others, 25c — refunded with first order.)

ALBERT CONSTANTINE AND SON, INC.
2050 Eastchester Rd., Dept. A-10,
New York 61, N. Y.

Albert Constantine and Son, Inc.
2050 Eastchester Rd., Dept. A-10,
New York 61, N. Y.
Send new 1961 edition of Constantine's Woodworking Catalog & Manual . . . FREE TO INSTRUCTORS. Students, enclose 25c — refunded with first order.
Name.....
Address.....
City.....State.....

CAN-PRO APRONS AND SHOP COATS
Coast-to-Coast Choice—for comfort, quality, low cost!

Instructors' coats designed for your comfort, long wear. 2 expertly tailored styles, 5 colors.

Here's low-cost protection for students' clothes... Shop aprons in a choice of colors.

Write for free material samples low factory-to-you prices!

CAN-PRO Corporation
42 E. McWilliams St. • Fond du Lac, Wis.
Another Subsidiary of J. M. Nash Co., Inc.

FLAME BLOWLESS TORCH

FOR QUICK HEAT UP TO
1000° F.

Melt, soften and form plastics, dry glues and paints quickly, safely . . . NO FLAME. Complete with adjustable and detachable stand. 110-120 V. AC-DC motor. Adjustable air intake. Order direct or through your supplier.

Model 12750 — 110 Volt $41.25
Other models available with lower temperature ranges

MASTER APPLIANCE CORP., Racine, Wis.

"eye-ease green" — are a few of the changes.

The "1030" is a professional model designed for use in schools.

For more information on this product write to the firm, Department M, Lancaster, Pa., mentioning SCHOOL SHOP; or *circle no. J-8 on the business-reply card.*

Three New Vivicopy Machines Announced by Smith-Corona

Three new Vivicopy machines that will copy anything on sensitized, white, standard weight paper have been placed on the market by the Smith-Corona Div. of Smith-Corona Marchant, Inc.

Information received from the company states that all models operate on the diffusion-transfer principle, utilizing light, and a developer for the instant transfer of an exact image on white, sensitized paper.

Model designations of Vivicopy 9, 12, and 14, are according to paper-width capacity.

For additional information write to the firm at Syracuse 1. N. Y., mentioning SCHOOL SHOP; *or circle no. J-9 on the business-reply card.*

Gemaco Offers Unfinished Fireplace Set

Gemaco Machine Co. is now offering a metalworking project in the form of an unfinished fireplace set. A variety of drilling, threading, polishing, and assembly operations are necessary to finish the set. Brass and iron castings and complete plans are supplied with the set.

For additional information write to the company at Box 295, Garden Grove, Calif., mentioning SCHOOL SHOP; or *circle no. J-10 on the business-reply card.*

Bookbinding Tools, Equipment, Supplies is a 12-page catalog by Craftool. An extensive collection of tools, equipment, and supplies for the bookbinding craft are listed, described, and illustrated. To receive a free copy, write to the firm at 396 Broadway, New York 13, N. Y., mentioning SCHOOL SHOP; or *circle no. J-11 on the business-reply card.*

Teach Basic Electricity by Demonstration, by Experimentation is the title of a bulletin by Educational Products Div., Magnetic Devices, Inc. The bulletin describes the Electro-Lab, a compact instrument designed to teach the fundamentals of electricity. For your free copy, write to the firm at Frederick, Md., mentioning SCHOOL SHOP; or *circle no. J-12 on the business-reply card.*

S-12 Knee Type Milling Machines is the designation of a 40-page, two-color illustrated bulletin that describes and lists specifications of Kearney & Trecker's new additions to the 'S'-Series line of knee type milling machines. Also available are brochures on the firm's newest additions in numerically controlled machine tools, described as the "tape controlled manufacturing center," and a new vertical-head, bed-type milling machine. To receive these bulletins write to the firm at 6784 W. National Ave., Milwaukee 14, Wis., mentioning SCHOOL SHOP; or *circle no. J-13 on the business-reply card.* (*Turn to Page* 41)

PAULSON
FACE SHIELD

Use for grinding, buffing, chipping, polishing, machine shop operation. Plastic interchangeable headgear with spark deflector and sweatband. Face protector made of quality optical acetate, easily replaceable. Free of distortion. May be worn over eye glasses.

Black or White Headgear. Clear, Light Amber or Light Green Face Protector. Write for Catalog and School Discounts

PAULSON MFG. CORP.
Fallbrook California

PLASTIC
FOR INDUSTRIAL ARTS

A complete source of supply, personal service, lowest prices, fast service. Complete satisfaction assured.

Send for our catalog, give us a trial, 15 years of service to schools and teachers.

Plastics Products Co. of Utah
P.O. Box 1415 937 East 9th South
Salt Lake City 10, Utah
Frank Delvie, Manager

Knockdown Cedar Chests, Veneer Chests and Aromatic Red Cedar Lumber

Please Send $0.25 for Catalog

Bedford Lumber Co., Inc.
SHELBYVILLE, TENN.

New Catalog of fresh ideas
for project activities in plastics, ceramics, leather, wood, metal.
Handsome desk and project accessories — desk fountain pens, desk balls pens and pencils, swivel-funnel-holders, plus many new items!

Gilbert & Miller INC. 484 FOURTH AVE. NEW YORK 16, N.Y.

Karle Spin-Shop
Metal Spinning the Safe Way

A complete metal-spinning program, with exclusive, patented safety devices make the Karle Spin-Shop plan safe for all students from grade 7 to grade 12.

Repeat installations in many schools prove reliability of Karle Spin-Shop program.

For brochure, write to:

KARLE SPIN-SHOP CO. INC.
105 State Street • North Warren, Pa.

FREE 'ENCYCLOPEDIA' of CRAFTS and FINISHES!

Contents at a glance

...new DONJER catalog packed with practical information and illustrations – recommended and used by shop teachers everywhere!

PARTIAL CONTENTS: "Suede-Tex" Projects • Wood and Metal Finishes • Enamel Sprays • Lacquers • Paints • Metal Foil • Designs • plus many other items for exciting school shop projects!

Write: *Also Available (upon request)— new #75 Electronics Catalog.*

DONJER PRODUCTS COMPANY
1398 UTICA AVENUE, BROOKLYN 3, NEW YORK

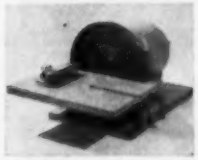
COMPOUND ANGLE CALCULATOR for WOODWORKING

SAVE WOOD — SAVE TIME — Saw compound angles for tapered planter boxes, shadow box frames, etc., IN ONE CUT.

QUICK — ACCURATE — SIMPLE — One operation calculates both miter gauge and tilt setting. Educational discount 40% on order of 12 or more. *Write for free folder.*

MITERITE Campbell, Calif. **$1.00 ppd.**

METALWORKING PROJECT CASTINGS



For:
- Junior-High
- Senior-High
- Vocational Shops
- Colleges
- Home Workshops

Modern Design Free Catalog — **Wide Selection Write Today**

Gemaco
Box 295 • Garden Grove, California

STOCK CUTS

Printing Instructors! Write today for a sample showing. It's FREE!

- Athletic
- Seasonal
- Decorative Spots
- Cartoon Spots

COBB SHINN 723 Union Street Indianapolis 25, Ind.

PERFECT PROJECTS

Pre-cut, ready-to-assemble wood-working kits of every description. Over 60 to choose from. Cedar chests, gun racks, tables, water skis, archery sets, bedroom suites and many others.

Write for the new 4-color illustrated catalog.

Giles & Kendall Co.
BOX D HUNTSVILLE, ALA.

Bulletin W-102 is an illustrated 28-page catalog describing a newly developed line of school and dressing room lockers by Worley & Co., a division of Ekco Products Co. The catalog contains information about locker specifications, dimensions of the company's line, and detailed information on locker construction. A glossary of locker terminology is also included. To receive a copy write to the firm at Dept. C, 802 W. Whittier Blvd., Whittier, Calif., mentioning SCHOOL SHOP; or *circle no. J-14 on the business-reply card.*

Carbide Tipped Saws in Industry is a 12-page booklet by the Systi-Matic Co., that tells, in an interesting readable style, the story of the development of carbide-tipped saws. Many good tips on the use and care of carbide-tipped blades are included. Free to shop teachers, write for your copy to the company at 1041 King St., Seattle, Wash., mentioning SCHOOL SHOP; or *circle no. J-15 on the business-reply card.*

Condensed Electronic/Electrical Product Reference Guide is a 10-page booklet by the Superior Electric Co. Designed to fit into a three-ring binder, the product guide contains ratings and other technical data on frequently ordered products of the company. For your copy write to the firm at Dept. PG, Bristol, Conn., mentioning SCHOOL SHOP; or *circle no. J-16 on the business-reply card.*

Tube Bending for Electricians is a 32-page booklet published by Republic Steel Corporation. Especially written to help solve tube-bending problems for electricians, it uses step-by-step illustrations for bending procedures. For more information, write to the firm at 224 E. 131st St., Cleveland 8, Ohio, mentioning SCHOOL SHOP; or *circle no. J-17 on the business-reply card.*

South Bend Machine Tools is the title of a new 96-page catalog recently released by South Bend Lathe, Inc. The catalog shows the complete line of engine and toolroom lathes, milling machines, shapers, drill presses, and pedestal grinders. Much of the content is devoted to tools, attachments, and accessories for use with the various machines. Complete specifications, descriptions, and prices are included. To receive your free copy of Catalog 1960, write to the firm at South Bend 22, Ind., mentioning SCHOOL SHOP; or *circle no. J-18 on the business reply card.*

From Washington *from page 48*

They share in paying for new classroom space; for renovating older buildings to be used as schools. Industry also contributes teaching and demonstration equipment; helps pay instructors as well as instructors to train instructors.

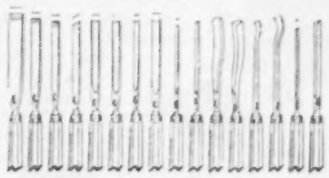
The joint training agreements cover some 20,000 apprentices in all

The deadline for sending in **SHOP TEACHERS SERVICE** coupons is:
February 28, 1961.
Send in Your Coupons Today!

Importers of top quality
CARVING TOOLS

FAST SELLING • GERMAN STEEL
CARVING TOOLS
OVER 50 SHAPES—FOR EVERY PURPOSE

used by Professional and Amateur Sculptors, Wood Carvers, Model and Pattern Makers, Hobbyists and Students.

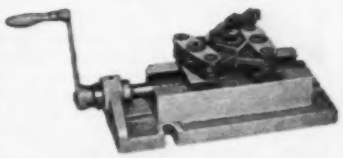


Complete sets of CHISELS, GOUGES & PARTING TOOLS. Forged & Hardened by skilled craftsmen to hold keen edge & give life-time service. Finest quality steel. Set of 16 tools as above only $29.50. Write today for New Free Folder.

FRANK MITTERMEIER
Est. 1934
3577 E. Tremont Ave. • New York 61, N. Y.

CLAMPMASTER

"the All-Purpose Vise"



HOLDS ANY SHAPE!

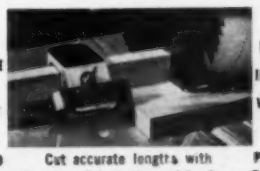
Priced from $79.20

- Fixture model with independently locking jaws
- Fast, foolproof operation
- Positive clamping
- Four sizes—Two models

Write for free illustrated brochures

Sole Agent for U.S.A.
KARL A. NEISE, Inc. NEISE MODERN TOOLS
Dept. SS, 404 4th Avenue, New York 16, N. Y.

FREE BROCHURE ON REQUEST



DEALERS INQUIRIES WELCOME

PATENTED — Cut accurate lengths with — PATENTED

L. Stahl's No. 21 Adjustable Stop Gauge

Cut stock to precision lengths on bench or radial saws. Graduated scale sets easily, assuring fast accurate work. 10 days free trial with money back guarantee. At your dealers or send $5.95 today. Postage prepaid. No C.O.D.'s.

NEW STYLE

The dowel center with the extra top lid for easy removal. Set ±24 (10 centers) 1 pr. of ea. ¼", 5/16", ⅜", 7/16", ½" in a plastic box. $1.25 Ppd.

L. Stahl Mfg., Dept. SS, 3166 Wadsworth, Saginaw, Mich.

FUTURE PRINTERS LEARN FASTER . . . BETTER WITH NOLAN

REMELT FURNACE . . .
- safe, easy to operate
- melts more metal in less time
- big furnace features in space-saving design

600-lb. unit pictured with accessory NOLAN ingot mold

PROOF PRESS . . .
- Low in cost — yet does the job of presses costing three times as much
- rugged tapered bearing design, available with or without cabinet

WRITE for complete information

NOLAN Corporation ROME, NEW YORK

—WOODSHOP INSTRUCTORS—
Have you heard about
Magna-Set?

U.S. Pat. No. 2,589,865

• • • • the magnetic Jointer and Planer knife-setter that is rapidly outmoding and replacing the old, mechanically inaccurate, time-consuming straight-edge method!

The necessity of tapping, prying and re-adjusting is entirely eliminated! Thousands now in use! Write for complete information and name of your nearest distributor.

MAGNA-SET COMPANY Dept. SS
632 NEW HAVEN AVE., MILFORD, CONN.

Maid-o'-Metal © Craft Metals and Supplies

Aluminum Brass Copper	Circles Foil Sheets	Designs Tools Supplies
Radius Forming Blocks	Special Forming Mallets	

NEW! Raised Edge, Pre-formed aluminum bases for mosaic trays and bowls.

Write to Dept. "T" for pricing folders, "How TO" Booklet, Catalog of enameling and metalcraft accessories.
$$$$ Special Discounts To Quantity Buyers $$$$

SPUN METAL PRODUCTS
P.O. BOX 403 LAFAYETTE, IND.

parts of the country who are working as inside electricians in the building trades. "I expect that very soon nearly every local of IBEW will have a plan for financing the training of apprentices," Mr. Damon said. As the activity expands, IBEW and NECA will begin preparing teachers' manuals and instructional materials covering new techniques and new processes in the electrician's trade. Mr. Damon also expects that locals will build new structures devoted entirely to apprenticeship training. Every year sees the completion of new schools — the more recent of these having been built in Kansas City, Mo., and Nassau County, Long Island.

In short, the electrical industry is intent on developing an apprentice training system on a nation-wide scale which, like any other educational system, would be complete with well-defined curriculum, instructional materials, teaching staffs, supervisors, and educational plant. Already many of these elements are in existence — including the well-known accouterment of any education, the graduation ceremony.

Not so long ago Mr. Damon addressed a commencement exercise in these words: "We are here tonight, members of management and labor, to honor young men who have completed a tough program of on-the-job training with a necessary and related period of classroom work which has prepared them to enter the electrical industry as journeymen.

"The brains of the world are constantly developing new uses for electrical energy, but without highly skilled manpower coming from the IBEW, having technical know-how and practical common sense, these new uses will be useless.

"If we can be sure of anything in the world, it is that the uses of electrical energy will undergo constant

SHOP TEACHERS
Complete stock of lamp parts for your lamp projects shown in our catalog. Also contains charts and instructions for building and wiring lamps. These valuable instructions and catalog sent for 25c.
GYRO LAMP & SHADE CORP.
R-5208 N.W. 35th Ave. Miami 42, Florida

FREE SAMPLE
UHU GLUE
Most versatile glue for every school use. Write on your school letterhead to:
UHU PRODUCTS CORP.
820 Greenwich St., New York 14, N.Y.

WAR SURPLUS and other bargains SAVE up to 90%
NEW 1961 CATALOG! containing 1000's of bargains in war surplus. 100's of pictures. Calipers, micrometers, squares, hydraulic pumps, instruments, etc. Request catalog on school commercial stationery.

AIRBORNE SALES CO., INC. Dept. SS-161
8501 Stellar Drive, Culver City, Calif.

LEATHERCRAFT AND METALCRAFT NEWEST CATALOG FREE!
Top-Quality supplies and complete kits for varied projects. All skills. Value priced. Complete stocks and prompt, accurate shipment. Leading school supplier for 25 years. New illustrated catalog and prices rushed to you FREE.
J. C. LARSON COMPANY
Dept. 1307, 820 S. Tripp, Chicago 24, Ill.

THE "IRON MIKE" CUTS THINNER THAN A DIME!
Portable POWER HACKSAW

Highly Accurate . . . Completely Automatic . . . Low Cost . . . Send for Free Folder.
ARCO MFG. CO.
DEPT. M-1, GRAND FORKS, N. DAK.

TEACH METAL SPINNING
If you have a good lathe, a few low cost Boice-Crane spinning tools and accessories are all you need.

Send for FREE instruction book and full details.
BOICE-CRANE CO.
938 Central Ave., Toledo 6, Ohio

LUMBER FOR SCHOOLS
Also Plywood and Dowels
Box 336, Paris, Illinois Established 1887
Write for our new free catalog
T. A. FOLEY LUMBER CO., INC.

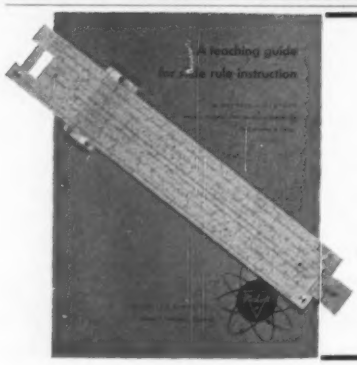
TINNERS' SNIPS FIVE SIZES

7" Size Stamped 8" 10" 12" and 14" drop forged Compound Lever Snips, Solid Tool Steel Blades. Capacity 24 to 18 ga. They cut to the point.
For Complete Data write
BARTLETT MFG. CO., 3012 E. Grand Blvd., Detroit 2, Mich.

CASTINGS for PROJECTS
CS
to TEACH Metal & Machine Shop Skills at all levels.
Used by over 3000 Schools in 50 States and 7 Foreign Countries.
Send for free Catalog
CASTING SPECIALTIES CO., Cedarburg 6, Wis.

NEW Alnico Generator $4.95!

With 40 ft. of wire and NEW telephone bell (Gov't. Surplus). Crank forward to generate up to 90 volts (will ring bell). Valued at more than $15.00. Weighs 4 lbs. Excellent experimental material.
All Shipments FOB Simpson.
Telephone Engineering Co.
Dept. 1Z1 Simpson, Pa.



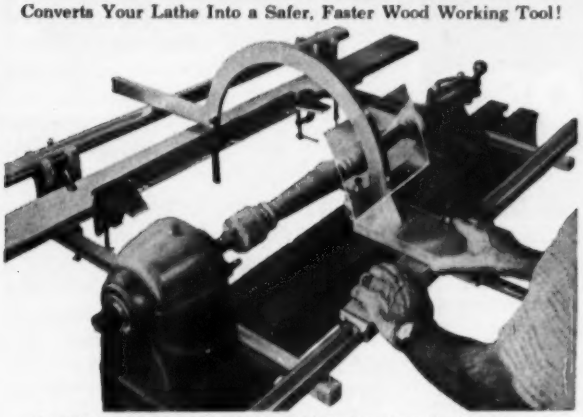
New TEACHING GUIDE for SLIDE RULE

FREE TO EDUCATORS. Now in its second printing, this 48-page Guide, prepared by Dr. Maurice L. Hartung, The University of Chicago, is written in easy-to-understand fashion and generously illustrated. Organized in sections that can be followed 1 - 12 by teachers without extensive experience, used selectively or for checking methods. See your Authorized Pickett representative for a free copy or write:

PICKETT All-American SLIDE RULES
542 South Dearborn Street, Chicago 5, Illinois

THE AMAZING GIZ...

Converts Your Lathe Into a Safer, Faster Wood Working Tool!



The first major improvement in wood-turning since the invention of the lathe, THE GIZ adapts to all wood-turning lathes. Beginners and amateurs turn out skillfully finished work; professionals increase their speed and accuracy almost beyond belief.

NOW...Let GIZ increase your **safety, versatility, pleasure!** Enjoy **absolute accuracy** in duplication, and prove to yourself that old-fashioned tool rests and dangerous chisels are obsolete.

Approved by instructors, hobbyists and manufacturers.

Write for complete details on the GIZ to:

GIZCO

P. O. Box 1103
Perry Annex
Whittier, Calif.

FREE! A Complete Plastics Buying Guide for the Instructor

COPE'S CATALOG OF PLASTICS AND CRAFT SUPPLIES

1961 Edition puts the Finest Selection of Plastic Sheets, Rods, Tubes, Liquids, Films — Tools — Findings — Manuals — Project Ideas at Your Fingertips . . . Includes Money-Saving School Discount Schedule!

No matter what your requirements — from cut-to-size pieces of Plexiglas to versatile, laboratory-type plastics forming presses —**COPE'S CATALOG** makes the job of obtaining all the plastics you need for industrial arts courses **easy and convenient.** It offers a DEPENDABLE ONE-STOP SOURCE for the hundreds of plastic items used in the school shop (some of which you see listed below), and contains information on applications and characteristics which you'll find helpful. Send today for your copy, and remember — at COPE you get same day service, lowest prices!

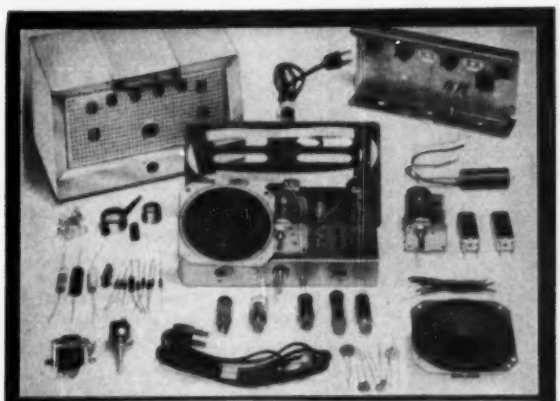
- ☐ Plexiglas, clear & colored
- ☐ Lucite Tubing & Rods
- ☐ Cellulose Acetate
- ☐ Styrofoam
- ☐ Adhesives, Buffing Wheels & Compounds
- ☐ Dyes, Blending Granules, Filling Plaster for Internal Carving
- ☐ Jewelry Findings
- ☐ Fiberglas-Polyester Resins
- ☐ Carving Tools, Drills
- ☐ Tenite II Screw Driver Handle Stock
- ☐ Castolite Liquid Casting Plastic
- ☐ Electric Ovens
- ☐ Salvage Materials
- ☐ Plastic Lacing, Cord, Ribbon & Belting

FREE! Step-by-step instruction sheets for distribution to students showing how to make Decorative Fiberglas Bowls and Internal Carvings. Write on school letterhead stating quantity of each you need.

COPE PLASTICS—ILLINOIS

Dept. Y • Highway 100 • Godfrey, Illinois

"Just Across the Mississippi from St. Louis"



Packard-Bell 'S 5RI IS BACK!!

5RI PACKARD-BELL (illustrated above) with horizontal chassis 5 tube superhet. kit 13.95

5R5 PACKARD-BELL vertical chassis superhet. kit $13.95

4RCI PACKARD-BELL clock radio kit $19.95

WRITE FOR FREE CATALOGUE describing Student electronic project kits • Electronic experimenter kits • Dynamic electronic demonstrator boards • High fidelity equipment kits • Electronic test equipment • Quality electronic parts at low prices.

ELECTRONIC KITS SUPPLY CO.

Dept. SS-1, 1727 Glendale Blvd., Los Angeles 26, Calif.

Craftsman's New Catalog FREE to Instructors

Fine Domestic and Imported **WOOD**

POWER TOOLS, HARDWARE, KITS
WORKSHOP SUPPLIES, EQUIPMENT

- ✔ 132 PAGES . . . many in full color . . . newest project ideas.
- ✔ Embossed mouldings, curved ornaments, and matched plywoods and veneers.
- ✔ Complete lines of archery and upholstering supplies.
- ✔ New! Blanks for baseball bats, snow skis, complete water ski kit.
- ✔ New! Clock Kits, Swiss Music Movements, Hi-Fi Cabinet Woods.
- ✔ New wood grain *Plastic* legs—all sizes!
- ✔ Same day shipment . . . guaranteed satisfaction.

CRAFTSMAN WOOD SERVICE CO.
2729 S. Mary St., Dept. K-1
Chicago 8, Illinois

1961 Edition—New Lines—Low Prices

INSTRUCTORS! Just mail coupon for your FREE COPY (25c to students, refundable with first order) of our giant new 1961 woodworking catalog. We are America's largest source of fine domestic and rare imported woods for projects. Also bandings, veneers, inlays . . . all shown in full color. See newest tools, equipment and hard-to-find cabinet hardware. Rush your request today!

CRAFTSMAN WOOD SERVICE CO., Dept. K-1
2729 S. Mary Street, Chicago 8, Ill.

Send new CRAFTSMAN WOODWORKER'S CATALOG—FREE (enclose 25c if student, refundable with your first order).

Name .....

Address .....

City ..... Zone..... State.....

purify the air they breathe

TORIT DUST COLLECTORS

for the school shop

School shop machinery necessarily creates dust. Such dust is irritating to the nose, throat, lungs and eyes . . . to the point of damaging your students' health. TORIT dust collecting machines are designed to protect health. They are portable, easily installed, and cost very little. Most important, Torit Dust Collectors have a proved high efficiency rating of up to 98% dust removal. Available in both cyclone (shown) and cloth filter models, wide range of sizes. Mail coupon today for FREE handbook describing Torit Collectors and applications.

Please send us FREE brochure on Torit Dust Collectors.

NAME_____

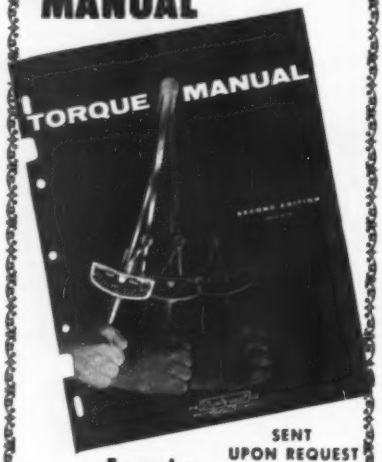
SCHOOL_____

ADDRESS_____

CITY_____ STATE_____

Educational Dept. **TORIT** Manufacturing Company
Dept. 1428, 1133 Rankin Street, St. Paul 16, Minn

"TORQUE WRENCH" MANUAL



SENT UPON REQUEST

Formulas
Applications
Engineering Data
Screw Torque Data
Adapter Problems
General Principles

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

AJUSTRITE CHAIRS AND STOOLS

LABORATORY AND SHOP STOOLS

- Adjusts to fit any student
- No soiled hands when adjusting seat

Model S-1827 has 13" diameter steel seat. Seat adjusts from 18" to 27". Steel glides.

Model RSS-2230 has 16" diam. tubular steel foot-ring welded to base. 13" diam. steel seat adjusts from 22" to 30". Casters, backrest, wood seat, seat pad or cushion available for both models.

FREE TRIAL Use an AJUSTRITE chair or stool for 30 days without obligation. Prove to yourself the many advantages AJUSTRITE offers in comfort, utility and economy. Write today—we'll do the rest.

10 YEAR GUARANTEE
32 Models for Factories • Schools • Laboratories • Hospitals • Offices

AJUSTO EQUIPMENT CO.
515 CONNEAUT ST. • BOWLING GREEN, OHIO

change. The electrical industry is a new industrial frontier."

And, if there is a second thing we can be sure of, it is that the industry's employes and industry's management are pretty much determined to move ahead in their efforts to accumulate funds for training, to prepare instructional materials, to develop curriculums, to hire and train instructors, and to build new schools.

Why Dualism? – Our glimpse into the training activities of industry raises questions: What is the implication of labor and management efforts to accumulate educational funds of their own and use these outside and independently of the public vocational schools? Are we soon to see dual systems of vocational and apprenticeship training? If so, what kind of relationships should those systems have? Would the nation be better off if labor and management, rather than "going it alone," supplemented the efforts of the public school system? How much duplication is there in labor-management efforts in developing instructional materials? Why is industry more willing to contribute heavily to joint apprenticeship committees than to public vocational schools? How much of a trend is there for labor and management to pull their apprenticeship training out and away from public vocational schools?

The AVA's Labor-Management Relations Committee has given some thought to these questions and so have one or two staff members in the U. S. Office of Education. But how soon will the answers to these questions emerge?

National Industrial Equipment Reserve. – We now make our way to the Pentagon, fourth floor, Ring B, Bay 6, Room 63 – a small office under the assistant secretary of defense for supply and logistics.

It is a busy place because schoolmen have beaten a path to it, and the telephone rings frequently. In charge, and answering a multiude of questions, is a personable young man with the name of Hugh McKane. What are schoolmen asking? The big question is: How can our vocational schools borrow tools and machines from the National Industrial Equipment Reserve?

The answer is neither brief nor simple, so let's start from the beginning.

Back in July 1948, President Tru-

Announcing

NEW! SPEEDY-MELT

Model B-30 Speedy Melt Furnace

- Gas fired, will use any type gas—manufactured, mixed, natural, bottled, or cylinder.
- Lined with sillimanite super refractory kiln burned shapes. Backed with refractory insulation. Heat resistant chrome iron top seal.
- Average Melting Schedule ——— #30 crucible
  Aluminum ——— 30 lbs. 12 minutes
  Brass ——— 110 lbs. 28 minutes
  Grey Iron ——— 90 lbs. 40 minutes
- With Speedy Melts fast melting time, molds can be made and poured in a one hour class period.
- Accessories available Safety line relay, solinoid gas valves, tongs, pouring shanks, asbestos gloves, leggings, flame proof aprons, pyrometers.
- Constructed to Industrial Standard. Price to fit limited school budget.
- Package unit includes furnace, blower, and 3 crucibles . . . $425.00 F.O.B. Danville, Illinois.
- Smaller and larger sizes available.

NATIONAL DISTRIBUTION THROUGH DISTRIBUTORS

Write for prices and sizes of Speedy Melt and Speedy Forge

McENGLEVAN

SPEEDY MELT DIVISION

P.O. Box 31, 700 Griggs Street • Danville, Illinois

PARKS PLANERS Give Your Students Practical Experience on Popular Industrial Machines

The PARKS No. 20

A modernly-designed, low-priced, high speed 20" x 6" thickness planer that meets the surfacing needs of every type of woodworking shop. Also available in 24" model.

Other PARKS WOODWORKERS

12" Planer

A compact, heavy-duty 12" x 4" planer that offers mill planer precision at low price.

Write for descriptive literature

No. 2 18" BAND SAW For Wood

M-2 18" BAND SAW For Metal

10" to 16" RADIAL SAWS

12" PLANER-JOINTER

The PARKS WOODWORKING MACHINE COMPANY

Manufacturers of Quality Woodworking Machines Since 1887

DEPT. 24, 1546 KNOWLTON STREET, CINCINNATI 23, OHIO

NEW!

SKIL ORBIT/LINE SANDER

Does both jobs...

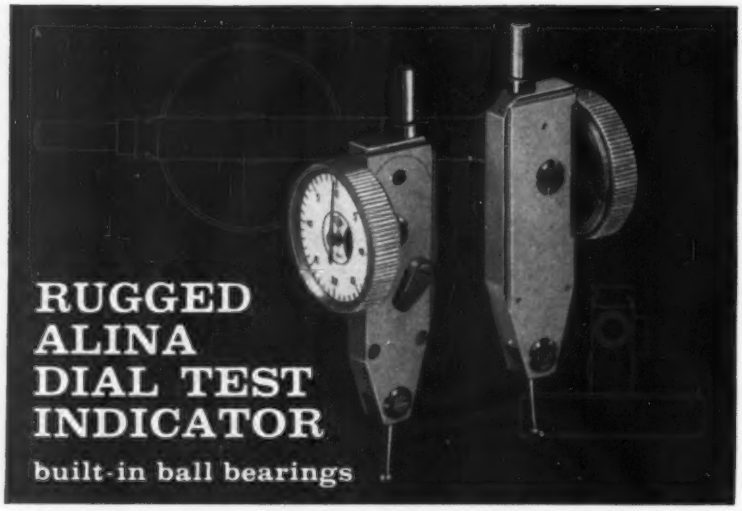
ORBITAL SANDING for fast sanding

STRAIGHT LINE SANDING for finest finishing

Now you flick a switch to get the right sanding action for any production sanding job with the Model 692. One minute it's a heavy duty orbital sander for fast stock removal (perfect whenever the sanded surface will be painted). The next minute it's a straight line sander for fine, "swirl free" finish work (perfect when the sanded surface will be stained, varnished or lacquered).

Ask your Skil distributor for a demonstration. Look under "Tools-Electric" in the Yellow Pages. Or for full information write: Skil Corporation, 5033 Elston Avenue, Chicago 30, Illinois. Dept. 141A.

SKIL ...AND SKILSAW POWER TOOLS



RUGGED ALINA DIAL TEST INDICATOR

built-in ball bearings

for greater sensitivity—reduced pressure—improved accuracy

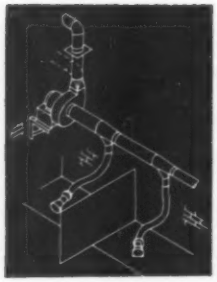
- Jeweled • Shock Proof • Range .032" • Graduated .0001"
- Reading 0-20-0 • Fully reversible contact point
- *Holder attaches to stem or to integral dove tails on body*

Available with a wide variety of rectangular or round shanks.

The instrument shown here is part of a complete line of precision DIAL TEST INDICATORS of all types — Write for brochure!

ALINA CORPORATION

122 East Second St., Mineola, L. I., N. Y.



NO WELDING FUMES IN THIS SCHOOL SHOP!

Here's a fast, inexpensive way to eliminate welding and soldering fumes from your school shop. National's overhead Smoke Removal System provides each welding station with a 4" ID flexible tube and accompanying hood for complete smoke removal. Ball joints permit hood to be moved anywhere on the work bench without twisting the tube. Screens prevent debris from entering system. Shut off dampers at each inlet stop unnecessary heat loss. Packaged kits available, ready to install. National engineers can design a system to meet your special requirements.

WRITE TODAY FOR COMPLETE DETAILS

NATIONAL SYSTEM OF GARAGE VENTILATION, INC.

143 W. WILLIAM STREET • DECATUR, ILLINOIS

Let KEY-BAK HELP CUT DRILL-PRESS ACCIDENTS

Attach SAF-T-CHUCK KEY-BAK to all drill-presses. Chuck key is always handy; SAF-T-CHUCK key springs out when released. It can NEVER, NEVER, NEVER be thrown from the whirling chuck. MODEL 7SK, $4.45 complete with #3 key. Key available in ten sizes.

$4.45 RETAIL

KEY-BAK KEY REEL

Wear regular KEY-BAK Key Reel on your belt. Pocket watch size, high-polished chrome finish. Swedish clock spring reels in 24" long stainless-steel chain. NO DANGEROUS, DANGLING CHAINS TO CATCH IN MACHINERY AND CAUSE ACCIDENTS. For your shop and maintenance-men. Order now!

$2.95 RETAIL

ORDER FROM YOUR JOBBER — OR WRITE DIRECT!

WEST OF MISSISSIPPI
Lummis Mfg. Co.
2242 E. Foothill Blvd.
Pasadena, Calif.

EAST OF MISSISSIPPI
CTL Company
1710 W. Stewart Ave.
Wausau, Wisconsin

OVER TWO MILLION KEY-BAKS SOLD!

man signed a bill which became Public Law 883 and carried the title of National Industrial Reserve Act. Section 7(5) set up a plan under which nonprofit institutions and training schools may borrow equipment for training programs which would "contribute materially to the national defense."

It was a sleeper clause and largely ignored by schoolmen until recently. But recently things began to perk up. More than a dozen vocational schools and technical institutes have borrowed equipment. More are queuing up, with application in hand, seeking loans. The queue is apt to get longer and the equipment supply is apt to get shorter. "It's best not to raise too many false hopes that everybody will be able to get what he's asking for," our informant tells us. "It's on a first come, first served basis – if you qualify."

The reserve supply is limited to metal-cutting and metal-forming machinery. The Defense Department would like schools to use it for training production workers – not technicians or engineers. Nor is the machinery to be used by schools to "fill out" their shop equipment, or "to plug up" holes, or modernize their training facilities. The Defense Department will restrict its loans to school authorities who do not have any metal-working shop department at all and which plan to develop new courses for metal-working occupations.

"Remember, now," our informant told us, "the government is not giving away the equipment. We're lending it. The government retains title to it and each agreement has a recapture clause, giving Uncle Sam the right to get it back, should he want it."

If you plan to apply for a loan, be prepared to write a very long letter covering no less than 25 points of information. The Defense Department will want to know all about you, your school, and your plans.

Is your institution approved by state authorities? What is the purpose of the training course for which you require the reserve equipment? How long and intensive a course do you propose? Will it be carried on by day, night, or both? Do you have enough money of your own to pay for shipping, installing, and maintaining the equipment? What qualifications have you established for the instructors who will teach this course?

How many hours a day do you

propose to devote to the use of equipment, to machine-shop theory, to drafting or blueprint reading? Do you have sufficient space to receive, install, and house the equipment? If not, when will the space be ready? Are you prepared to provide the blueprint of the building in which the equipment is to be installed and its floor loading capacity?

There are still more questions. What types of auxiliary items (micrometers, squares, height squares, calipers, cutting tools, stocks) do you have on hand for use in conjunction with the equipment? Will you agree to return the equipment on demand to the original point of government storage or to any other point directed by the Department of Defense? Will you permit a government representative to visit your training station to inspect the equipment and to check on how it's being used?

The more information you provide, the better the Defense Department will like it. Officials would also like to see a certified resolution from your board of education requesting the equipment. But none of this may clinch approval. There are some intangible factors – such as your location. Defense officials are dispersal minded, which means they do not want to concentrate production facilities in any one part of the country. A school in sparsely-settled Montana may have a better chance of getting the equipment than one in industrialized Connecticut. ★

Index TO ADVERTISERS . . .

Please note: For further information from advertisers, circle the "Number to circle on the card" adjacent to those companies listed below from whom you wish product information. Card is on next page.

No. to Circle on card		Page No.
1	Airborne Sales Co.	42
2	Ajusto Equipment Co.	44
3	Alina Corp.	46
4	Allied Radio Corp.	30
5	American Technical Society	2
6	Arco Manufacturing Co.	42
7	Armstrong Brothers Tool Co.	24
8	Atlas Press Co.	21
9	Bartlett Manufacturing Co.	42
10	Bedford Lumber Co.	40
11	Better Light Better Sight Bureau	28
12	Beverly Manufacturing Co.	37
13	Billings & Spencer Co.	35
14	Boice Crane Co.	42
15	Brodhead-Garrett Co.	6
17	Can Pro Corp.	40
18	Casting Specialties Co.	42
19	Central Instrument Co.	39
20	Cobb Shinn	41
21	Albert Constantine and Son, Inc.	40
22	Cope Plastics	43
23	Craft Metals Corp.	38
24	Craftsman Wood Service Co.	43
89	Delta Power Tool Div. Rockwell Mfg. Co.	5
90	Desmond-Stephan Mfg. Co.	4
91	Diamond Tool and Horseshoe Co.	Cov. 2
25	Don Jer Products Co.	41
26	EICO	20
27	Electronic Kits Supply Co.	43
28	J. A. Fay & Egan Co.	33
29	Foley Lumber Co.	42
30	Garrett Tubular Products, Inc. (Table)	37
31	Garrett Tubular Products, Inc. (Stool)	39
32	Gemaco	41
33	General Finishes Sales & Service Co.	20
34	General Scientific Equipment Co.	39
35	Gilbert & Miller, Inc.	40
36	Giles & Kendall Co.	41
37	Gizco	43
88	Goodheart-Willcox Co.	3
38	Greaves Machine Tool Co.	32
39	Gyro Lamp & Shade Corp.	42
40	Hammond Machinery Builders, Inc.	24
41	Hardwood Corp. of America	29
42	Immerman & Sons	47
43	Irwin Auger Bit Co.	37
92	Kalamazoo Tank and Silo Co.	35
44	Karle Spin-Shop Co., Inc.	40
85	King Machine & Mfg. Co.	25
45	H. W. Knight & Son	20
46	J. C. Larson Co.	42
47	Logan Engineering Co.	27
48	Lufkin Rule Co.	Cov. 4
49	Lummis Manufacturing Co.	46
50	Magna-Set Co.	42
51	Master Appliance Corp.	40
52	McEnglevan Heat Treating & Mfg. Co.	45
53	McGraw-Hill Book Co., Inc.	35
54	McPhee-Thoits Mfg. Co.	35
55	Miterite, Inc.	41
56	Frank Mittermeier	41
16	Morgan Vise Co.	48
57	National System of Garage Vent.	46
58	Karl A. Neise, Inc.	41
59	Nolan Corp.	42
60	Oliver Machinery Co.	26
61	Parker Manufacturing Co.	39
62	Parks Woodworking Machine Co.	45
87	Patterson Brothers	37
63	Paulson Manufacturing Corp.	40
64	Peck, Stow & Wilcox Co.	37
65	Pickett & Eckel, Inc.	42
66	Plastic Products Co.	40
86	Science Electronics, Inc.	31
67	Sheldon Machine Co., Inc.	22
68	Skil Corp.	45
69	South Bend Lathe, Inc.	Cov. 3
70	Spun Metal Products	42
72	Stacor Equipment Co.	25
71	L. Stahl Co.	41
73	P. A. Sturtevant	44
74	Teaching Aids, Inc.	23
75	Telephone Engineering Co.	42
76	Tepping Studio Supply Co.	39
77	George S. Thompson Corp.	47
78	Thomas C. Thompson Co.	39
79	Torit Manufacturing Co.	44
80	UHU Products Corp.	42
81	Universal Scientific Co.	34
82	Wilson-Imperial Co.	36
83	Wilton Tool Manufacturing Co.	14
84	X-acto, Inc.	36

FREE

ENAMEL on COPPER AND CREATIVE CRAFT IDEAS

From America's Largest Direct Source...

Only Immerman's (mfgr. of kilns, tools and supplies widely endorsed by schools, institutions and recreation programs) offers you such a completely satisfying, direct channel to supplies and "Here's How" information! Explore enameling, mosaics, metal tooling, etching, jewelry, marquetry, etc., etc. Send for these valuable reference volumes today.

IMMERMAN & SONS

Dept. CH-40 • 1924 EUCLID • Cleveland 15, Ohio

A-2795

for new and different projects...

guaranteed mechanisms

for:

PEPPER MILLS

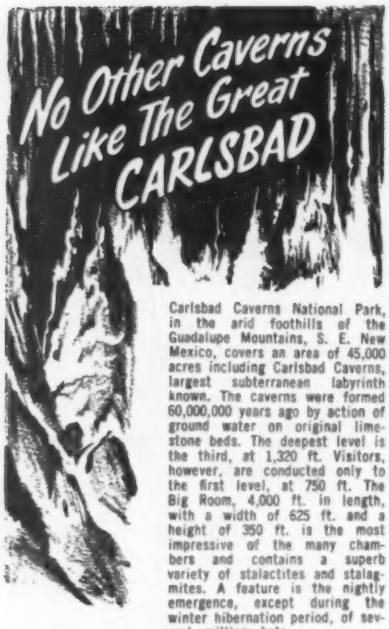
COFFEE MILLS

NUTMEG MILLS

Looking for new shop projects? Hundreds of instructors have discovered that Pepper Mills, Coffee Mills and Nutmeg Mills make excellent and practical projects. Now you can buy guaranteed mechanisms from the world's largest pepper mill manufacturer. Write today for price information and project sheets.

THE GEORGE S. THOMPSON CORPORATION

727 S. Monterey Pass Road, Monterey Park, Calif

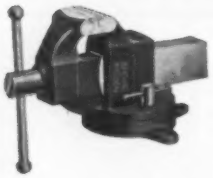


Carlsbad Caverns National Park, in the arid foothills of the Guadalupe Mountains, S. E. New Mexico, covers an area of 45,000 acres including Carlsbad Caverns, largest subterranean labyrinth known. The caverns were formed 60,000,000 years ago by action of ground water on original limestone beds. The deepest level is the third, at 1,320 ft. Visitors, however, are conducted only to the first level, at 750 ft. The Big Room, 4,000 ft. in length, with a width of 625 ft. and a height of 350 ft. is the most impressive of the many chambers and contains a superb variety of stalactites and stalagmites. A feature is the nightly emergence, except during the winter hibernation period, of several million bats.

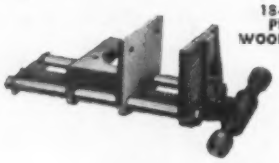
NO OTHER VISE LIKE

MORGAN

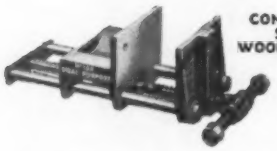
First In Schools Since 1892



MACHINISTS' BENCH
Solid jaw and swivel base



18-A DUAL PURPOSE WOODWORKING VISE



CONTINUOUS SCREW WOODWORKING VISE

CHOOSE FROM THE COMPLETE MORGAN LINE

For your next vise purchase consider Morgan, the vise with the unconditional guarantee without time limit restrictions. You have your choice of a complete range of sizes and types with Morgan's Woodworkers' (with solid aluminum handle), Machinists', Pipe and Combination Pipe Vises. When ordering complete bench unit from your bench mfr. specify Morgan Vises.

Write for complete Catalogue

MORGAN
VISE COMPANY
112 N. JEFFERSON ST.
CHICAGO 6, ILLINOIS

from Washington

by Michael Paca

Promises — But. — Kennedy made more promises to advance the cause of education than did Nixon. Kennedy was elected — and the educational lobby groups and the professional organizations which make Washington their home are pleased with the election results.

The list of promises which emanated from the Democratic Party and the mimeograph machine of candidate Kennedy is long — long and heady to those who believe in greater government support for education. Leading is the proposition that the federal government must institute a system of federal grants to states to help pay for both school buildings and teacher salaries. If carried out, this in itself would be an historic achievement. But the incoming Kennedy administration has more pledges to fulfill: federal dollars for college scholarships, fellowships, research, college housing, loans for needy students, educational television, adult education, migrant school children, library services; expansion of the school-lunch program, of the National Defense Education Act, of aid for school districts educating large numbers of children of federal employes. The Democrats also promised further development of vocational education and retraining opportunities for workers displaced by automation or made jobless by dwindling industries. Mr. Kennedy also endorsed the creation of a Youth Corps, in which "underprivileged" young men would get work experience and training to prepare them for jobs. And for young men and women blessed with special talents, Mr. Kennedy promised to create a Peace Corps from which the government would recruit technicians for service overseas.

Conservatives in the Saddle.—What Congress will do is, of course, a crucial question. And as Washington educators look at the Congress, their headiness gives way to sober-mindedness. It is a Democratic-controlled Congress, to be sure. But the election has failed to return some of the liberal stalwarts who in the past had voted for liberal school bills; and the election has brought some 20 Republicans to House seats where Democrats sat last year. Conservatives will still stand guard over House Policy, Rules, and Education Committees. This presages a tough battle for any federal aid to education, and if a victory comes it'll be a squeak-through victory, in line with the election results.

Training for the Electrical Industry. — Back in October, after reviewing briefly the training and education activities of the plumbing and pipefitting industry, we promised to look at the electrical industry to see what it is doing to maintain a supply of trained manpower for the present and the future.

The person with whom to start such an inquiry is Bill Damon. He is director of the National Joint Apprenticeship and Training Committee for the Electrical Industry. In this role he encourages local unions and employers to get together in planning and carrying on apprentice training. He has been doing that for many years. He likes to mention that the electrical industry has been promoting apprentice training for nearly a quarter century. Nevertheless, it is true that a strong spurt has taken place only within the last three years. Today, Mr. Damon can count some 275 agreements between locals and employers under which there is a specific financing plan for training. Ways to pay for apprentice training vary — and all are equally acceptable. Some plans call for an assessment against payrolls; others call for a 2c contribution for every hour worked by journeymen and apprentices; still others call for a flat fee from management alone, or from both management and labor.

The word "joint" is the key to a successful apprenticeship training activity. Locals of the International Brotherhood of Electrical Workers (IBEW) are doing their share. So are local employers, especially those associated with the National Electrical Contractors Association (NECA). Industrialists are heavy contributors to nearly all phases of apprenticeship.

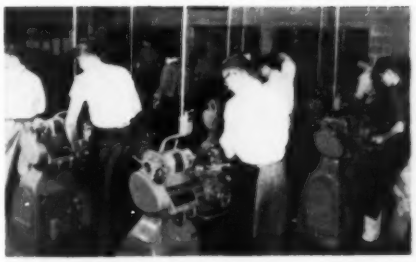
(*Continued on page* 41)

K. F. Ludemann
Head of Industrial
Arts Department

"...South Bend Lathes give us maximum performance..."

"We have used South Bend Lathes in our shops since 1933. Past performance was a definite factor when we came to equip our new school. We have found that South Bend Lathes give us maximum performance with a minimum of maintenance."

This comment by Mr. Ludemann on their twenty-seven years of experience with South Bend Lathes expresses what educators are always looking for in shop equipment—maximum performance with minimum maintenance. You get it, plus unsurpassed suitability and many other advantages, when you buy South Bend Lathes. Write us . . . let us send you complete information.



Waukesha (Wisconsin) High School
John Lehockey, Instructor

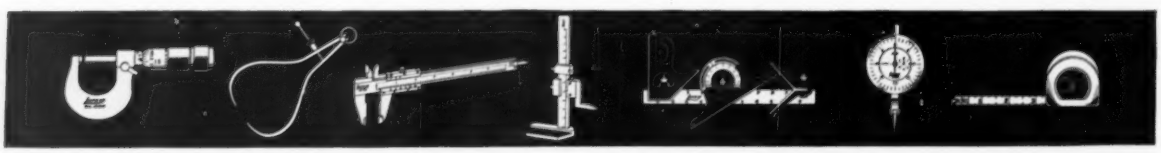
SOUTH BEND LATHE, INC. SOUTH BEND 22, INDIANA

BUILDERS OF LATHES • MILLING MACHINES • SHAPERS • DRILL PRESSES • PEDESTAL GRINDERS

Lufkin helps you teach the meaning of accuracy

Exact measurement is a truth of craftsmanship.

Lufkin helps you develop true-measurement standards in your students. Because Lufkin precision tools are made with the greatest possible accuracy to provide the most exact measuring results.

For example — the exclusive contact points of this Lufkin Mike Hole Gage let you measure hole sizes *right down to the bottom*. Can detect geometric error in out-of-round holes down to .0001". Readings are easier, more accurate because of extra space between graduations on the big-barreled head—and the black markings stand out in any kind of light against the nonglare *Chrome Clad®* satin finish.

See your industrial distributor. He knows precision tools—maintains his stock to fit your needs. He'll give you prompt attention, fast delivery and reliable service always. LUFKIN, Saginaw, Mich.